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Submitted to:
Clean Harbors Environmental Services
Coffeyville, Kansas

Submitted by:
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Fort Collins, Colorado
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April 2013

Clean Harbors PPM, LLC Coffeyville Facility Corrective Measures Implementation 5-Year Review Report

RCRA ID# KS981506025

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April 29, 2013

Mr. Ken Herstowski
United States Environmental Protection Agency
Region VII
901 North 5th Street
Kansas City, Kansas 66101

**Subject: Corrective Measures Implementation 5-Year Review Report
Clean Harbors PPM, LLC, Coffeyville, Kansas Facility
RCRA ID# KSD981506025**

Dear Mr. Herstowski:

AECOM Technical Services, Inc. (AECOM), on behalf of Clean Harbors PPM, LLC (Clean Harbors), is submitting the enclosed report presenting and discussing the results from implementing the 5-Year Review Work Plan for the Clean Harbors Coffeyville LLC Facility near Coffeyville, Kansas. This report should assist in completing the 5-year review of the remedy for the facility.

Please feel free to contact me at (970) 530-3506 or Marty Smith of Clean Harbors at (417) 358-0826 if you have any questions or comments about the enclosed report.

Yours sincerely,

Gregg Somermeyer

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cc: Martin Smith – Clean Harbors

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Clean Harbors PPM, LLC Coffeyville Facility Corrective Measures Implementation 5-Year Review Work Plan

RCRA ID# KS981506025

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List of Acronyms

µg/L	Micrograms per liter
µS/cm^2	Microsiemens per square centime
AECOM	AECOM Technical Services, Inc.
bgs	Below ground surface
Clean Harbors	Clean Harbors PPM, LLC
cm/min	Centimeter per minute
CMS	Corrective Measures Study
COC	Chain-of-custody
DCA	Dichloroethane
DCE	Dichloroethene
EC	Engineering control
ETI	Envirometal Technologies, Inc.
IC	Institutional control
K	Hydraulic conductivity
KCl	Potassium chloride
KDHE	Kansas Department of Health and Environment
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mL	Milliliter
mS/cm	Millisiemens per centimeter
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated biphenyls
PCE	Tetrachloroethene
PFM	Passive Flux Meter
POU	Point-of-use
PRB	Permeable reactive barrier
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
ROW	Right-of-way
SB	Soil-bentonite
SIM	Specific ion monitoring
TCA	Trichloroethene
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VC	Vinyl chloride
VOC	Volatile organic compound
ZVI	Zero-valent iron

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1.0 Introduction

AECOM Technical Services, Inc. (AECOM), on behalf of Clean Harbors PPM, LLC (Clean Harbors), has prepared this report to document an evaluation of corrective measures at the Clean Harbors Coffeyville LLC Facility (Facility) near Coffeyville, Kansas. The purpose of this report is to support the United States Environmental Protection Agency (USEPA) 5-year review process for corrective measures at the Facility. The corrective measures evaluation includes an analysis of the effectiveness of the funnel-and-gate Permeable Reactive Barrier (PRB) system that was installed at the Facility in two phases in 1996 and 1999. This report also documents field activities and presents the results of implementing the USEPA-approved Corrective Measures Implementation 5-Year Review Work Plan (AECOM 2011) for the subject Facility, which collected additional data to support the 5-year review process.

2.0 Background

This chapter includes a brief history of the Facility, the regulatory status of the Facility, and the regulatory basis and purpose of the 5-year review of corrective measures.

2.1 Facility Location and History

The Facility is located approximately 4 miles north of Coffeyville, Kansas, on 406 acres at the southern end of the Coffeyville Industrial Park (**Figure 2-1**). The Facility consists of five contiguous tracts or parcels of land (Tracts A, B, D, E, and F) as shown on **Figure 2-2**. Ownership of a sixth parcel, Tract C, was retained by a former owner/operator of the Facility.

The operating portion of the Facility (Tracts A and B) was located on approximately 200 acres at the southern end of the Coffeyville Industrial Park, adjacent to the Coffeyville Municipal Airport. The Facility formerly included a commercial waste incinerator that was permitted through the Toxic Substances Control Act and the Resource Conservation and Recovery Act (RCRA) to incinerate waste materials containing polychlorinated biphenyls (PCBs) and RCRA hazardous wastes.

The incinerator and supporting storage facilities have been closed, although the Facility continues to be used for cleaning electrical equipment containing PCBs. All industrial activities are conducted within Tracts A and B. Tracts D and F, located west and south of Tracts A and B, are leased to Coffeyville Community College for agricultural use. Tract E, north of Tracts A and B, separates the operating part of the Facility from the remainder of the Coffeyville Industrial Park to the north, and is maintained as a grass-covered field.

2.2 Regulatory Status

A consent order was executed between the USEPA and Aptus in 1988, following the discovery of impacted soil and groundwater during on-site construction activities. The consent order required completion of a soil and groundwater investigation at the Facility. A RCRA Part B permit then was issued to Aptus in 1991 for the incineration of hazardous wastes in addition to PCBs. Conditions of the hazardous waste permit (RCRA ID# KSD981506025) required completion of a Corrective Measures Study (CMS) to evaluate alternatives for addressing impacted soil and groundwater at the Facility.

2.2.1 Interim Measures

In 1992, USEPA requested an interim measures plan to stabilize the site by controlling impacted groundwater and minimizing further migration. In response to USEPA's request the following engineered remediation systems were installed in 1995/1996 following USEPA approval:

- A pump-and-treat system to extract and treat groundwater, and provide hydraulic control of dissolved volatile organic compounds (VOCs) in the central source area. The system consisted of a submersible pump, which extracted groundwater from a sump beneath the Process Building and conveyed it to an air stripper for removal of VOCs from the aqueous phase. The stripped VOCs were exhausted through a stack and the treated groundwater was discharged to the City's publicly owned treatment works sewer line. **Figure 2-3** depicts the layout of the pump-and-treat system.
- A PRB funnel-and-gate system employing zero-valent iron (ZVI) to provide in-situ treatment of groundwater along the western perimeter of Tract F (**Figure 2-2**). The system is comprised of a 975-foot-long, low permeability soil-bentonite cutoff wall and a 30-foot-long ZVI "gate" designed to destroy chlorinated VOCs through abiotic reductive dechlorination reactions. The PRB system was designed to reduce dissolved concentrations of VOCs to below Maximum Contaminant

Levels (MCLs). **Figure 2-4** depicts the layout of the current funnel-and-gate system, which includes the portion of the system (Phase I) installed along the western perimeter of Tract F. **Figure 2-5** depicts construction details of the PRB gate portion of the Phase I system.

- A point-of-use (POU) well water treatment system on the Adams farm west of Tract F (**Figure 2-2**) was installed as a contingency measure should the contaminant plume reach the wellhead. A private water supply well is located on the Adams farm and used for livestock and garden watering. The treatment system consists of two canisters containing granular activated carbon designed to remove dissolved VOCs from the groundwater.

An extension to the original PRB funnel-and-gate system (Phase II) was designed and installed as a supplemental interim measure in the spring of 2000. Phase II was installed along the western, southern, and eastern edges of Tract F (**Figure 2-4**).

The Phase II funnel-and-gate system consists of a soil-bentonite cutoff wall and two PRB gates. The Phase II cutoff wall was connected to the Phase I cutoff wall near the southwest corner of Tract F, and runs along the southern and eastern perimeter of the property, as shown on **Figure 2-4**. The total length of the Phase II cutoff wall is approximately 3,132 feet. It extends from near ground surface approximately 30 feet down to bedrock. One Phase II gate was constructed within the Phase I cutoff wall approximately 225 feet north of the Phase I Gate. The second Phase II gate was constructed in the east-west portion of the cutoff wall approximately 215 feet west of the southeast corner of the property. **Figure 2-6** depicts the construction details of the two Phase II PRB gates.

An activated carbon adsorption unit was installed downstream of the groundwater pump-and-treat system air stripper in 2004. The carbon unit was installed to provide further polishing of the treated groundwater prior to discharge to the municipal sewer system. A filter unit containing an assembly of wound cartridge elements was installed upstream of the carbon unit to prevent fouling of the carbon vessels.

2.2.2 Selected Remedy

The CMS for the Facility was completed in 2000 (ThermoRetec 2000a) following completion of interim measures construction activities. The CMS alternative evaluation was subsequently modified in 2003. USEPA then revised the Facility's RCRA Permit to incorporate the selected remedy. Part 2 of the revised RCRA Permit (effective September 28, 2005) required implementation of the following corrective measures at the Facility:

- A funnel-and-gate system to treat contaminated groundwater as it flows beneath the site. The Facility is required to maintain the funnel-and-gate system as set forth in the Interim Measures As Built Report (SECOR 1996) and the Phase II Interim Measures Report (ThermoRetec 2000b). The location and layout of the funnel-and-gate system is shown on **Figure 2-2**
- A system for treatment of groundwater extracted from the farm west of Tract F. The Facility is required to continue to provide and maintain the interim measures point-of-use carbon adsorption system for treatment of groundwater pumped from a private well on the Adams farm near Tract F (**Figure 2-2**).
- Enforceable Institutional Controls (ICs) to prevent construction, which could damage or interfere with the funnel and gate system, prevent groundwater extraction or usage at the Facility (except as may be necessary as part of an interim measure or remediation system), and prevent uses of the Facility that would result in exposure of workers or visitors to chemicals released and present at the Facility, which have not been evaluated in the risk assessment documents prepared during the corrective action process (RETEC 2004; SECOR 1998). As described in the IC Plan (RETEC 2006), a set of restrictive covenants on the property were planned to satisfy this requirement of the Permit.

The interim measures groundwater pump-and-treat system is currently maintained in standby mode.

2.2.3 Corrective Action Goals

As stated in the RCRA Permit for the Facility (RCRA ID# KSD981506025), the remedy objectives must:

- Be protective of human health and the environment;
- Control the source(s) of release(s) so as to reduce or eliminate, to the maximum extent practicable, further releases that might pose a threat to human health or the environment; and
- Meet all applicable federal, state, and local laws and regulations.

The RCRA Permit also establishes constituent-specific corrective action objectives, or cleanup standards, for chemical compounds detected in soil and groundwater on-site and off-site. **Table 2-1** presents chemical-specific cleanup standards for on-site soil. **Table 2-2** presents interim cleanup standards for on-site groundwater. The RCRA Permit requires that groundwater off-site shall meet USEPA MCLs for drinking water where they have been promulgated for site contaminants. If an MCL has not been promulgated for a site contaminant, a residential criterion for groundwater shall be based upon USEPA's Risk Assessment Guide for Superfund (USEPA 1989). Applicable cleanup levels for chemical compounds detected in off-site groundwater are summarized in **Table 2-3**. These cleanup standards also represent the final cleanup standards for on-site groundwater.

2.2.4 Effectiveness and Performance Monitoring

Part II, Section 12 E of the RCRA Permit requires monitoring the effectiveness and performance of the remedy. Regularly scheduled groundwater monitoring events are a primary component of the effectiveness and performance monitoring plan. These monitoring events include groundwater level measurements and collection and analysis of groundwater samples at designated wells and piezometers.

The first groundwater monitoring event was performed in 2007. The second first-year monitoring event was performed in 2008. The results of the 2008 monitoring event were presented and discussed in the 2008 Annual Remedy Effectiveness and Performance Evaluation Report (AECOM 2009). The results of the 2009 monitoring event were presented and discussed in the 2009 Annual Remedy Effectiveness and Performance Evaluation Report (AECOM 2010). The results of the May 2010 monitoring event were presented and discussed in the 2010 Annual Remedy Effectiveness and Performance Evaluation Report (AECOM 2011). The results of the May 2011 monitoring event, which included three new monitoring wells (MW-29AR, MW-29BR, and MW-35BR) that were installed to replace three monitoring wells abandoned due to the Highway 169 expansion project (MW-29B, MW-29B, and MW-35B), were presented in the 2011 Annual Remedy Effectiveness and Performance Evaluation Report (AECOM 2012). The annual monitoring event for 2012 was completed in late April 2012. The results of the 2012 annual monitoring are presented and discussed in this report.

2.2.5 5-Year Remedy Performance Review

Part II, Section III.N.4 of the RCRA Permit requires a Corrective Measures Implementation 5-Year Review. The review shall be consistent with the Comprehensive Environmental Response, Compensation, and Liability Act comprehensive 5-Year Review Guidance, and evaluate and report on:

- Annual reports required in Part II Condition III.N.3;
- Effectiveness of corrective measures in protecting human health and the environment as planned in the statement of basis;
- Effectiveness of engineering controls (ECs) and ICs in protecting human health and the environment as planned in the statement of basis;

- Results of sampling and analysis to determine the effectiveness and performance of the corrective measures;
- Any changed circumstances that render the corrective measure, including ECs and ICs, ineffective; and
- Possible modifications to the corrective measures to provide necessary protection.

The following chapters of this report present data from implementation of the 5-Year Review Work Plan, and evaluate remedy effectiveness[1]. In accordance with the Permit, and based upon the results of the 5-Year Review, the Permittee may be required to modify an existing corrective measure or select a new corrective measure or measures. If action is needed to protect human health or the environment from releases, or to prevent or minimize the further spread of contamination while long-term remedies are pursued, the Permittee may be required to implement Interim Measures.

[1] The facility permit states that a five-year review report will be submitted by August 10, 2010. As documented in the May 12, 2010, letter from Bonnie C. Martin of Clean Harbors to Ken Herstowski of USEPA, Clean Harbors and USEPA determined that the report would not be submitted until after the activities specified in the 5-Year Review Work Plan were completed and the resulting data fully evaluated.

3.0 Field Investigations

Additional investigations were performed at the Facility to support the 5-year review of the remedy, including the PRB funnel-and-gate system. This work included field tests to gather data for evaluating the hydraulic performance of the PRB funnel-and-gate system, additional groundwater investigation to further assess the extent of dissolved VOCs, and sampling to determine the potential presence of 1,4-dioxane in groundwater. The field tests and investigations included the following activities:

- Testing to evaluate PRB hydraulic characteristics
  - Aquifer slug tests in PRB wells
  - Borehole dilution tests in PRB wells
  - Groundwater flow velocity determination using Passive Flux Meters (PFMs)
  - Exploratory boring in PRB reactive media
- Further delineation of the Southeast Plume, south and east of Tract F
  - Installation, development, gauging, and sampling of new piezometers and monitoring wells
- Further delineation of the Northwest Plume in Tract D, west of Highway 169
  - Groundwater sampling using direct-push equipment
  - Utilization of a mobile laboratory to expedite and guide plume delineation
  - Surface water sampling
- Assessment of the presence of 1,4-dioxane
  - Groundwater sampling and analysis of selected monitoring wells for 1,4-dioxane

The routine annual groundwater monitoring event occurred in April 2012, generally concurrent with the 5-year review field investigations. Since the data generated by the annual groundwater monitoring event are useful in evaluating remedy performance, they are incorporated into the discussions and evaluations of this report.

3.1 PRB Hydraulic Assessment

A hydraulic assessment of the performance of the funnel-and-gate system was conducted to determine whether the system is effective in capturing the dissolved plume of chlorinated VOCs in the vicinity of Tract F. The assessment included aquifer slug tests, borehole dilution tests, and deployment of PFMs to evaluate flow through the three PRBs.

3.1.1 Aquifer Slug Tests

Aquifer slug tests were performed in monitoring wells installed in the Phase I Gate, Phase II Gate 1, and Phase II Gate 2. The resulting test data were used to calculate hydraulic conductivities of the reactive media in the three PRBs (gates).

The hydraulic conductivities of multiple wells in each gate were compared to provide an indication of fouling due to accumulation of inorganic precipitates. An increasing trend in conductivity in the direction of groundwater flow could indicate fouling, since fouling is expected to be more extensive near the upgradient edge of a gate. The results also could be used to support modeling, if necessary, during future PRB performance evaluation.

In December 2011, AECOM field personnel performed rising head slug tests on the following wells in the three PRBs:

- Phase I Gate: IW-1 (**Figure 2-5**);
- Phase II Gate 1: IW1-1, IW1-2, IW1-3, IW1-4, IW1-5, IW1-6, IW1-7, IW1-8 (**Figure 2-6**); and
- Phase II Gate 2: IW2-1, IW2-2, IW2-3, IW2-4, IW2-5, IW2-6, IW2-7, IW2-9, IW2-10, IW2-11 (**Figure 2-6**).

The slug tests were performed by pressurizing the head space of each well, then measuring the water level response after rapidly releasing the pressure. Each well was pressurized using compressed air introduced through an apparatus attached to the top of the well casing (**Figure 3-1**). A pressure transducer was lowered to the middle of the screened interval and connected to a laptop computer to enable real-time monitoring of water level during each test.

Each well was pressurized to depress the water level to a depth approximately 2 feet above the top of the well screen. Care was taken not to depress the water level below the top of the screen. The desired change in water level for each well was determined based on the measured depth to water, total depth, and screened interval.

The target pressure was applied to each well and monitored using a gauge attached to the test apparatus. Once the desired pressure was reached, the compressor was left running and the pressure stabilized using a bleed valve on the test apparatus. Transducer readings were monitored in the field to ensure the water was being displaced and the seal maintained on the system.

The pneumatic slug test was started after the desired head displacement was achieved and the pressure in the well stabilized. The transducer was set to record water level data and the pressure quickly released from the well, after which the change in head was recorded as the water level returned to its static level. Transducer data were recorded using Win-Situ software and water level trend graphs generated for each well.

One well, IW-1, was tested in the Phase I Gate. Well IW-2, the other well installed in the ZVI zone of this PRB, could not be tested because it was physically damaged during installation in 1996. The remaining six monitoring wells in the Phase I Gate were not tested because they were installed in the upgradient and downgradient gravel zones on either side of the ZVI zone. The wells tested in Phase II Gate 1 included IW1-1 through IW1-8.The wells tested in Phase II Gate 2 included 11 wells, IW2-1 through IW2-11.

3.1.2 Borehole Dilution Tests

Borehole dilution tests were performed on selected wells in the PRBs to obtain information regarding the hydraulic characteristics of the ZVI reactive media. The borehole dilution tests generally involved introducing a tracer into an isolated interval of a PRB monitoring well screen, and monitoring concentration versus time as the tracer is carried by groundwater flow out of the well and into the surrounding media.

An inflatable well packer was used to isolate the bottom of the well screen from the rest of the water column (**Figure 3-2**). The packer was lowered to a depth approximately 2 feet above the bottom of the well, and the bladder inflated using a portable air compressor. The packer consisted of a rubber bladder fitted around sealed 4-inch polyvinyl chloride (PVC) casing with two pieces of copper tubing running through the middle, one tube approximately 2 feet longer than the other. The copper tubing functioned as delivery and return ports for the tracer solution. Polyethylene tubing attached to the copper tubing was connected to an aboveground peristaltic pump to circulate the isolated column of water in the well interval below the packer through a flow-through cell at the surface to monitor water quality parameters during each test (**Figure 3-2**).

The flow-through cell contained a YSI 556 MDS with 600XLM sonde that was calibrated daily using sodium chloride standard solutions in concentrations of approximately 500, 1,000, 2,000, and 5,000 parts per million. A T-fitting in the tubing downstream of the pump was used to introduce tracer solution into the test well. The quantity of tracer injected was planned to increase the background electrical conductivity by approximately 200 percent. The objective was to continue monitoring conductivity during each test until the tracer concentration dropped to about 40 percent of the initial concentration, in order to obtain a concentration vs. time graph suitable for borehole dilution velocity calculations.

Borehole dilution tests were planned in wells at all three PRB gates. In December 2011, dilution tests were successfully performed in three wells (IW1-3, IW1-5, and IW1-8) in Phase II Gate 1 (**Figure 2-6**). No borehole dilution tests were performed in the Phase I Gate or Phase II Gate 2 due to suspected obstructions or casing deflection, which prevented lowering of the test apparatus to the target depth.

For the dilution tests, a 3 molar concentration potassium chloride (KCl) solution was used as the tracer. Red food-grade dye also was added to visually observe transport of the tracer in the tubing and provide visual evidence of concentration reduction over time during testing. Each test was started by turning on the peristaltic pump to circulate water from below the packer through the flow cell, where parameters including electrical conductivity, temperature, and pH were monitored and continuously recorded using a YSI water quality meter.

After baseline water quality parameters had stabilized, approximately 1 to 5 milliliters (mL) of the KCl solution was added to the recirculating groundwater. The valve to the tracer reservoir was then closed and field parameters monitored by the YSI meter and recorded in 2-second intervals. A spike in electrical conductivity was observed in each dilution test approximately 10 minutes after the solution was introduced to the well. Based on the amount of solution added, the spike ranged from 0.1 to 2.4 microsiemens per centimeter squared (µS/cm^2). Water quality parameters were recorded at regular intervals until electrical conductivity returned to its baseline value or the test was stopped.

In IW1-8, the initial conductivity of the tracer solution was 193.3 µS/cm^2. The initial conductivity of the downhole water was 0.585 µS/cm^2. Upon injection of the tracer, the downhole conductivity spiked to 3 µS/cm^2. After 4.5 hours, the downhole conductivity had not changed appreciably and the test was terminated. Approximately 15.5 hours later a grab sample was bailed from the well and a conductivity of 2.865 µS/cm^2 was measured. Subsequent slug testing of this well showed that the well would not hold air pressure, and a quick bail-down test exhibited slow water recovery compared to tests of neighboring wells. These results indicate this well may be damaged or plugged at depth.

In well IW1-3, the initial conductivity of the downhole water was 0.688 µS/cm^2. Upon injection of 1 mL of tracer, the downhole conductivity spiked to 0.805 µS/cm^2. After approximately 4 hours, the measured downhole conductivity was 0.814 µS/cm^2. Explanations for this small change may be that the tracer spike may have not been large enough, and conductivity may have been influenced by temperature and other factors.

A successful test was completed in well IW1-5. For this test, the initial conductivity of the tracer solution was 231.2 µS/cm^2, and 0.835 µS/cm^2 for the baseline circulating downhole water. Upon injection of 5 mL of tracer solution, the downhole conductivity spiked to 1.056 µS/cm^2. After approximately 10 hours, the downhole conductivity had changed to 0.833 µS/ cm^2, with the tracer being transported into the surrounding media and the circulating water returning to baseline conditions. Conductivity calculations and further analysis of this test are presented in Section 5.2.3.

3.1.3 Passive Flux Meters

PFMs were designed and custom-built by EnviroFlux, LLC for field measurement of groundwater velocity through the three PRBs at the site. Each PFM consisted of a flexible sock filled with activated carbon adsorbent impregnated with measured quantities of five water-soluble alcohol compounds: methyl alcohol, ethyl alcohol, isopropyl alcohol, tert-butanol, and diisopropylcarbinol. The PFMs were custom-built for installation in the PRB monitoring wells, which are approximately 30 feet below ground surface (bgs), 2- or 4-inch-diameter, with 10-foot screens. Each PFM was lowered into a selected PRB monitoring well (**Figure 3-3**) and left for a pre-determined length of time, during which the soluble tracer compounds were gradually released into the groundwater as it flowed through the PFM. The PFMs were then removed and shipped back to EnviroFlux, where the tracer compounds were extracted from the sorbent to quantify the remaining mass. The extent of tracer depletion was then used to calculate groundwater flow velocity at each location and depth interval.

Two new 2-inch-diameter monitoring wells (M-10 and M-11) were installed in the Phase I Gate to facilitate PFM emplacement. The well borings were advanced using Geoprobe Macro-Core® and Geoprobe Dual-Tube samplers. Continuous soil core was recovered in acetate sleeves, and well logs were generated following ASTM D2488 for Visual-Manual Classification of Soils. Boring Logs are presented in **Appendix A**. The Geoprobe sampler was advanced until refusal in each boring. Geoprobe rods were then swapped with 4.25-inch hollow stem augers, and the hole was reamed to depth. M-10 and M-11 were installed with 10-foot-long Schedule 40, 0.010 inch slot size PVC screens without a filter pack. Well seals were installed using bentonite chips in 5-foot lifts hydrated with municipal water. Expansion caps and above-grade locking well boxes were installed on both wells.

M-10 and M-11 were developed by purging with a bailer and a peristaltic pump connected to disposable polyethylene tubing. Bailing three well volumes initially removed sediment, and acted as a surge block to set the filter pack. Each well was purged until sediment was no longer visible in the purge water. Drill cuttings and development water were placed into new drums, labeled, and stored at the Facility. All investigation derived wastes were managed in coordination with Clean Harbors and in compliance with applicable rules and regulations.

Each PFM was 5 feet long with a diameter approximately equal to the well diameter (**Figure 3-3**). Two PFMs were emplaced in each test well to span the screened zone and assess vertical variation in groundwater velocity. PFMs were successfully emplaced in two new monitoring wells in the Phase I Gate (M-10 and M-11), one existing well in Phase II Gate 1 (IW1-5) (**Figure 2-6**), and two existing wells in Phase II Gate 2 (IW2-3 and IW2-4) (**Figure 2-6**). PFM installation was unsuccessful in Phase I Gate wells IW-1 and IW-2, which may be explained by bent or damaged casings or screens.

The PFMs were left in each well for approximately 10 days, after which they were pulled from the wells. The PFM in IW2-3 could not be removed because the wire hangar failed during retrieval. After the PFMs were removed, each sorbent sock was cut open and the activated carbon placed into clean stainless steel bowls. The sorbent media from the upper half of each PFM was separated from the material from the lower half. The material in each bowl was homogenized by stirring. The samples (two from each PFM) were then packed in special containers and shipped using standard chain-of-custody (COC) procedures to EnviroFlux for analysis. See Section 5.2.2 for a discussion of PFM testing results.

3.1.4 ZVI Visual Assessment

On January 10, 2012 one, 2-inch exploratory boring was advanced using a Geoprobe rig into the Phase II Gate between IW1-2 and IW1-1 (**Figure 2-6**). The boring was continuously sampled to 26 feet bgs, where the sampler could no longer be advanced due to flowing ZVI/sand. The ZVI/sand mixture was visually inspected and photographed (**Figure 3-4**). The material was black, similar to its original appearance, with no sign of discoloration or visible signs of oxidation or calcification. **Figure 3-4** also displays a photograph of core sample collected during installation of a new 2-inch-diameter monitoring well in the Phase I Gate to facilitate PFM emplacement. This location of the well was approximately midway between the upgradient and downgradient faces of the 100 percent ZVI in the Phase I Gate. Similar to the sample from Phase II Gate 1, the core sample from this gate shows no visible signs of precipitate accumulation.

3.2 PRB Funnel-and-Gate and Southeast Plume Delineation

Field investigations were performed to further delineate the extent of the dissolved plume of VOCs to the south and southeast of the active Facility. These investigations involved installation and sampling of piezometers in Tract F, installation and sampling of piezometers on farm property owned by the City of Coffeyville southeast of Tract F, and sampling of existing monitoring wells on AIW-owned property south of Tract F (**Figure 2-2**). All new and existing wells and piezometers are shown on **Figure 3-5**. Monitoring well locations in the three PRBs are shown in **Figure 3-6**. Legal access agreements were required before drilling and sampling could occur on the properties owned by AIW and the City of Coffeyville.

Fourteen new piezometers were installed and sampled (**Figure 3-5**), including:

- Six new piezometers in the vicinity of SP-16 near the northeastern end of the funnel-and-gate soil-bentonite wall (PF-23B, PF-24B, PF-27B, PF-28B, PF-30B, and PF-31B);
- One new piezometer in the west-central area of Tract F (PF-22B);
- One new piezometer in the east-central area of Tract F (PF-26B);
- Four new piezometers just inside the soil-bentonite (SB) wall opposite other existing wells outside the SB wall (PF-20B, PF-21B, PF-25B, and PF-29B); and
- Two new piezometers on City of Coffeyville property between the Tract F boundary and MW-36B/37B (PF-32B and PF-33B).

Installation of these piezometers occurred on the following dates: January 9-10, 2012 (PF-21 through -24); January 18-19, 2012 (PF-25 through -31); and February 7, 2012 (PF-32 and -33).

Piezometer borings were advanced using Geoprobe Macro-Core® and Geoprobe Dual-Tube samplers. Continuous soil core was recovered in acetate sleeves. Soil logs were generated following ASTM D2488 for Visual-Manual Classification of Soils. Boring logs for the new piezometers are presented in **Appendix A**.

Piezometer borings were advanced to refusal using the Geoprobe rig, which in most cases was the top of the weathered limestone bedrock surface, generally observed near 30 feet bgs. Wells were installed with Geoprobe Pre-Pack screens, which are factory assembled 1-inch-diameter, 0.010-inch slot size, schedule 40 PVC with 10/20 filter pack sand in a stainless steel sock screen around the PVC. These pre-packed screens ensured placement of the filter pack evenly without bridging. Above the pre-pack screen, 2 feet of 10/20 sand was added to segregate the screen from the bentonite seal installed above. Bentonite sand was installed in 3-foot lifts and hydrated with local municipal water. Expansion caps were installed and piezometers were left as stick-ups.

The piezometers were developed by purging at least three well volumes using a peristaltic pump and new, disposable polyethylene tubing. Surging was not necessary given the use of pre-pack screens for well construction. Drill cuttings and development water were drummed, labeled, and stored at the Facility. All investigation derived waste was managed in coordination with Clean Harbors and in compliance with applicable rules and regulations.

Fourteen existing monitoring wells and piezometers also were sampled (**Figure 3-5**), including:

- Six existing monitoring wells in Tract F (SP-12, SP-13, SP-14, SP-15, SP-16, and M-8);
- Six existing monitoring wells (MW-11, MW-13, MW-15, MW-16, MW-17, and MW-30B) and three existing piezometers (PF-6B, PF-13B, and PF-14B) on American Insulated Wire property south of Tract F; and
- Two existing monitoring wells on City of Coffeyville property (formerly owned by Kenny King) southeast of Tract F (MW-36B and MW-37B).

Groundwater samples were collected from all of these new and existing wells and piezometers and submitted to a commercial testing laboratory for analysis of VOCs. Copies of field sampling forms are included in **Appendix C**. Copies of the resulting laboratory analytical reports are included in **Appendix D**.

3.3 Northwest Plume Delineation Activities

Field investigations were performed to further delineate the extent of the dissolved plume of VOCs to the northwest of the active Facility. These investigations involved installation and sampling of new monitoring wells, and collection of groundwater grab samples using a direct-push Geoprobe rig. Legal access agreements were required before drilling and sampling could occur on two off-site properties north of Tract D owned by Richard Felts and Roger/Cathy Robinson (**Figure 2-2**). AECOM and Clean Harbors attempts at obtaining an access agreement with the landowner (Kim and Catherine Fisher) of the 19.9-acre triangular-shaped property bordered on the east and west by Tract D (**Figure 2-2**) were unsuccessful.

Two new 2-inch-diameter monitoring wells, MW-38B and MW-39B, were installed in Tract D on January 11 and 12, 2012, respectively (**Figure 3-5**). The well borings were advanced using Geoprobe Macro-Core® and Geoprobe Dual-Tube samplers. Continuous soil core was recovered in acetate sleeves, and well logs were generated following ASTM D2488 for Visual-Manual Classification of Soils. Boring Logs are presented in **Appendix A**). The Geoprobe sampler was advanced until refusal in each boring. Geoprobe rods were then swapped with 4.25-inch hollow stem augers, and the hole was reamed to depth.

MW-38B and MW-39B were constructed with Schedule 40 PVC risers and 0.010 inch slot size, 10-foot-long screens. A 10/20 sand filter pack was installed from the bottom up to approximately 2 feet above the top of the screened interval. Well seals were installed using bentonite chips in 5-foot lifts hydrated with local municipal water. Expansion caps and above-grade locking well boxes were installed on both wells.

MW-38B and MW-39B were developed more than 24 hours after installation by purging with a bailer and a peristaltic pump connected to disposable polyethylene tubing. Bailing three well volumes initially removed sediment, and acted as a surge block to set the filter pack. Each well was purged until sediment was no longer visible in the purge water. Drill cuttings and development water were placed into new drums, labeled, and stored at the Facility. All investigation derived wastes were managed in coordination with Clean Harbors and in compliance with applicable rules and regulations.

Groundwater samples were collected from MW-38B and MW-39B on January 17, 2012, and submitted to Test America and Accutest Laboratories for analysis of VOCs and 1,4-dioxane, respectively. Based on a review of the analytical results for MW-39B, and subsequent discussions with USEPA, additional grab samples of groundwater were collected in the vicinity of Tract D using direct push (Geoprobe) equipment to delineate the full extent of dissolved VOCs in that area. Grab samples of surface water also were collected from several ponds and Big Hill Creek in the vicinity of Tract D.

Grab samples of groundwater and surface water were collected at 44 and 9 locations, respectively (**Figure 3-5**), including:

- Sixteen groundwater sampling locations in Tract D east of Big Hill Creek (GW-20 through -29, GW-50, GW-51, and GW-65 through -68);
- Three groundwater sampling locations within the right-of-way (ROW) of the county road bordering the north edge of Tract D (GW-30, -31, and -32);
- Seven groundwater sampling locations in Tract D west of Big Hill Creek (GW-33 through -39);

- One groundwater sampling location on private property north of Tract D and east of Big Hill Creek owned by Roger and Cathy Robinson (GW-40);
- Thirteen groundwater (GW-52 through -64) and four surface water (pond) sampling locations (SW-1, -2, -3, and -4) on private property north of Tract D and east of Big Hill Creek owned by Sherwood Construction Company, Inc.;
- Four groundwater sampling locations on private property north of Tract D and west of Big Hill Creek owned by Richard Felt (GW-69 through -72); and
- Five surface water samples from Big Hill Creek (SW-5 through SW-9).

These samples were collected on the following dates: May 2-3, 2012 (GW-20 through -26); October 23-25, 2012 (GW-30 through -40); and January 7-11, 2013 (GW-41 through -72 and SW-1 through -9).

The groundwater samples collected in May and October 2012 were shipped to Test America or Accutest Analytical Laboratories for VOC analysis using EPA SW-846 Method 8260B. The groundwater samples collected in January 2013 were analyzed using a mobile laboratory operated by Environmental Chemistry Consulting Services, Inc., although several duplicate samples also were sent to Test America for comparison purposes.

3.4 1,4-dioxane Assessment

Groundwater samples also were collected at 26 sampling locations for analysis of 1,4-dioxane using a modified approach to EPA Method 8260 with specific ion monitoring (SIM) to achieve detection limits below the current USEPA health-based action level of 6.1 micrograms per liter (µg/L). These sampling locations were selected because they were at or close to the Facility boundary (perimeter wells), or were locations where 1,1,1-TCA was detected during recent monitoring events. These included the following (**Figure 3-5**):

- One monitoring well (MW-11B) near the center of the Facility;
- Two monitoring wells (MW-8B, MW-33B) in Tract E north of the Facility;
- Four monitoring wells (MW-28B, MW-31B, MW-38B, MW-39B) and seven Geoprobe sampling locations (GW-33 through 39) in Tract D northwest of the Facility;
- Three Geoprobe sampling locations (GW-30, GW-31, and GW-32) located within the ROW of the county road north of Tract D;
- Geoprobe sampling location GW-40 located on private property north of Tract D;
- One private water supply well (Adams-A) and one monitoring well (MW-29BR) on the Adams farm;
- Two monitoring wells (AIW-MW-16B and MW-30B) on AIW-owned property south of Tract F;
- Monitoring well M-8 downgradient of Phase II Gate 2;
- Monitoring well SP-16 at the northeast corner of the funnel-and-gate system in Tract F south of the Facility; and
- Off-site monitoring wells MW-36B and MW-37B on City of Coffeyville property southeast of Tract F.

These samples were shipped to Accutest Analytical Laboratories for analysis using the modified 8260-SIM method.

3.5 Water Level Measurements

On February 23, 2012, water levels were measured in 97 wells and piezometers (including newly installed measuring locations) in the vicinity of the Facility (**Figure 3-5**) for purposes of constructing a groundwater elevation contour map to facilitate evaluation of groundwater flow directions at the site. Copies of the completed field data forms are included in **Appendix C**. The measured depth to water from the top of casing, and the calculated water elevation above mean sea level, are summarized in **Table 3-1**.

3.6 Annual Groundwater Monitoring

Annual groundwater monitoring is a primary component of the effectiveness and performance monitoring plan. These monitoring events include groundwater level measurements and collection and analysis of groundwater samples at designated wells and piezometers. The annual monitoring event for 2012 was performed between April 21 and 27, 2012. Water levels and total well depths were measured on April 21, and samples were collected starting on April 22 and finishing on April 27. Sampling included 46 monitoring wells and piezometers, and one private water supply well on the Adams farm (**Figures 3-5** and **3-6**). Samples also were collected between and downstream of the two activated carbon adsorption canisters installed as a precaution to treat water from the Adams farm well. All monitoring well and piezometer sample containers except VOC containers were filled using a peristaltic pump. Waterra pumps (consisting of dedicated high-density polyethylene tubing and a Teflon foot-valve) were used to collect samples from wells and piezometers for VOC analysis.

Per the Quality Assurance Project Plan, field quality assurance sampling included one trip blank per cooler analyzed for VOCs, one blind duplicate per 20 samples analyzed for VOCs, and one field blank per sampling event. Copies of the completed field data and sampling forms are included in **Appendix C**. All samples from the annual monitoring event were shipped under COC control to Test America for VOC analysis using EPA Method 8260B, metals using EPA Method 6010B, alkalinity using SM20 2320B, and selected ions in accordance with EPA Method 300.0.

4.0 Remedy Monitoring Results

As discussed in Sections 3.2 through 3.5, field investigations were performed to evaluate the funnel-and-gate system performance, and further delineate the extent of the dissolved plume of VOCs southeast and northwest of the active Facility. These investigations involved measurement of water levels and sampling of new and existing piezometers and monitoring wells (**Figures 3-5** and **3-6**). Section 3.6 described annual groundwater monitoring conducted in 2012, which is a primary component of effectiveness and performance monitoring of corrective action at the Facility.

A comprehensive round of water level measurements was taken on April 23, 2012. These measurements and corresponding elevations are presented in **Table 3-1**. **Figure 4-1** represents a potentiometric surface map of groundwater constructed from measurements taken from wells and piezometers screened in the lower alluvium.

Laboratory analytical reports for samples collected during implementation of the 5-Year Review Work Plan and 2012 annual groundwater sampling are included in **Appendix D**. The laboratories provided electronic data deliverables for each batch of samples, which were imported into the EQuIS project database. Field parameters were entered into the project database by hand. All field parameter measurements (DO, ORP, pH) and analytical chemistry data are presented in **Tables 4-1**, **4-2**, and **4-3**. **Figures 4-2** through **4-13** map the analytical results for key VOC constituents in groundwater at the Facility (PCE; TCE; cis-1,2 DCE; 1,1-DCE; VC; 1,1,1-TCA; 1, 2-DCA; and 1,4-dioxane).

4.1 On-site Groundwater

Table 2-2 summarizes the interim on-site groundwater cleanup levels for the active facility. Current on-site concentrations exceed the TCE cleanup standard of 610 µg/L in six monitoring wells, and PCE standard of 8,360 µg/L in one well (14,000 µg/L in MW-6B); all other constituents are below their interim cleanup standards (**Table 3 2**, **Figure 3-4**). The highest concentrations were detected in the vicinity of MW-6B, MW-11B, MW-12B, and MW-13B. PCE and TCE concentrations are expected to remain high in these areas due to the remaining residual mass in the soils and slow reverse diffusion from the clay soil matrix.

4.2 Funnel-and-Gate System

The remedy selected for the Facility included a PRB funnel-and-gate system to treat contaminated groundwater. The funnel-and-gate system was constructed in two phases of interim measures in 1996 and 1999. The PRB funnel-and-gate system employs ZVI to provide in-situ treatment of groundwater along the western, southern, and eastern perimeters of Tract F, and is comprised of three ZVI gates designed to destroy chlorinated VOCs through abiotic reductive dechlorination reactions, and an interconnecting low permeability soil-bentonite cutoff wall to direct the flow of groundwater through the gates.

The primary function of the funnel-and-gate system is to prevent additional migration of contaminants beyond the Facility property boundaries at levels exceeding risk-based concentrations. The funnel-and-gate system was installed to address an area south of the operating part of the Facility (Tract F) from which contaminants were found to have migrated off-site. Periodic groundwater monitoring has been performed to monitor the operation and effectiveness of the funnel-and-gate system. Monitoring involved the sampling of monitoring wells installed upgradient, within, and downgradient of the three PRBs. The results of monitoring have been presented and discussed in previous Annual Remedy Effectiveness and Performance Monitoring Reports. The most recent annual groundwater monitoring was conducted in April 2012.

4.2.1 PRB Monitoring

Annual groundwater monitoring includes the measurement of dissolved VOCs, iron, cations, chloride, pH, ORP, and alkalinity in wells within and near the three PRBs to monitor chemical reactions in the PRBs and the extent of contaminant destruction. Previous results (**Table 4-4**) have shown significantly higher pH and lower ORP in each PRB compared to background conditions, a typical characteristic of ZVI PRBs and indicative of the highly reducing conditions most conducive to reductive dechlorination of chlorinated VOCs.

A review of historical ORP measurements from the Phase I Gate indicates a trend toward less reducing conditions over time, recently shifting from mildly reducing to oxidizing conditions between 2011 and 2012 at IW-1 (**Table 4-4**). This may be limited to the immediate vicinity of IW-1, the well in the ZVI part of the PRB where measurements were made, but it also may be evidence of declining reactivity of the Phase I Gate, the first PRB installed at the Facility almost 16 years ago in 1996. (Note that: (1) IW-2 was damaged during installation and is not available for sampling; (2) wells within the PRBs have shown temporary oxidizing measurements in the past, e.g., IW2-3; and (3) wells sampled on either side of the Phase I PRB still exhibit reducing conditions.)

A review of historical ORP and pH data for Phase II Gate 1, installed in 1999, shows a decline in ORP and pH in IW1-2 between 2011 and 2012. This well is located closer to the upgradient edge of the PRB than IW1-5, which continues to show strong reducing conditions and a corresponding high pH. This may indicate that the reactivity of the PRB is decreasing near the upgradient edge of the PRB, possibly caused by deposition of inorganic precipitates on the surface of the ZVI.

ORP and pH data for wells installed in Phase II Gate 2, also installed in 1999, do not indicate a general trend, although ORP in a well installed closer to the downgradient edge of the PRB, IW2-10, shows a slow, steady decline in reducing conditions over time, and ORP and pH near the middle of the PRB are less than in 2008.

Historically, measured concentrations of chlorinated VOCs are very low in the reactive sections of all three PRBs, in most instances to below detection limits. No PCE, TCE, or 1,1,1-TCA was detected in the three PRBs during annual monitoring in April 2012. A low concentration of 1,2-DCE, a daughter product of reductive dechlorination of PCE and TCE, was detected in one well in each of the Phase II gates. A low concentration of 1,2-DCA, which generally is not amenable to treatment by ZVI, also was detected in monitoring well IW-1 in the Phase I Gate. Although methylene chloride was detected in samples from the PRBs in 2012, it is not likely to be present because it also was detected in the associated laboratory method blank and trip blanks.

The 2007 Annual Report also discussed the fate of VC in the vicinity of the Phase I Gate. The results of 2007 monitoring indicated that VC was being treated in the Phase I Gate, but variations were observed across the flow path through the gate. Possible explanations include varying concentrations entering different parts of the gate due to converging groundwater flow paths, and preferential flow paths in the ZVI caused by precipitation induced channeling. In 2011, VC was detected at 18 µg/L in upgradient PRB gravel well GW-2, non-detect in downgradient PRB gravel well GW-5, and 5.5 µg/L in downgradient (on-site) well M-2. In 2012, VC was detected at 5.3 µg/L in GW-2, non-detect in ZVI well IW-1, 2.8 µg/L in GW-5, and 6 µg/L in downgradient (on-site) well M-2. Further downgradient of the Phase I Gate, VC was not detected in off-site wells MW-29AR or MW-29BR in 2011 or 2012.

VOC concentrations in groundwater were measured upgradient and downgradient of the gates to monitor the reduction of VOCs occurring within the gates as well as contaminant attenuation downgradient. As noted in the previous annual reports, VOC concentrations in the nearest upgradient well may not be representative of actual concentrations entering the gates due to the funneling effect of the low permeability barrier wall and converging groundwater flow lines entering each gate. Historical results show that VOCs are effectively destroyed within the gates.

In spite of reactions occurring in the PRB gates resulting in the documented destruction of chlorinated VOCs, the effect on downgradient concentration trends appears to be mixed. Historical plots of VOC concentrations in the nearest downgradient monitoring well in native soil for each PRB are shown in **Figure 4-14**. These three wells (M-2, M-6, and M-8) are located on-site near the boundary of the Facility. An examination of the plot for the Phase I Gate shows that VOCs downgradient of the Phase I Gate are generally below MCLs, although cis-1,2-DCE and VC have increased in recent years, with VC measured at 6 µg/L in April 2012, above the MCL of 2 µg/L.

VOCs downgradient of Phase II Gate 1 showed mixed trends, with TCE increasing until a sudden decrease in 2012, PCE gradually decreasing, and cis-1,2-DCE decreasing then increasing in recent years. PCE, TCE, and VC concentrations exceed MCLs downgradient of Phase II Gate 1. Off-site and further downgradient, PCE and TCE were not detected in perimeter monitoring well MW-29BR in April 2012. 1,2-DCA, 1,1-DCA, 1,1-DCE, and 1,2-DCE were detected at low concentrations below their respective MCLs.

Downgradient of Phase II Gate 2, PCE and TCE concentrations show a general decline in recent years, although they are above MCLs. Similar to conditions near Phase II Gate 1, PCE and TCE in M-8 have exceeded MCLs since Phase II Gate 1 installation, as they did prior to Phase II funnel-and-gate construction in 1999.

4.2.2 Plume Capture Monitoring

Groundwater VOC concentrations also have been measured near each end of the soil-bentonite barrier (funnel) as an indicator of hydraulic control, or plume capture, provided by the PRB funnel-and-gate system. Results from recent years show that VOCs are not present in groundwater at the northern end of the west wing of the funnel-and-gate system, as measured in M-4. The results from M-4 suggest that the groundwater plume is not bypassing the northwestern end of the funnel-and-gate system.

Annual monitoring in April 2009 detected a relatively sudden increase in concentration of TCE in SP-16. This well is located near the northern end of the eastern wing of the funnel-and-gate system, outside (east of) the soil-bentonite cutoff wall, and serves as a sentinel well to monitor for possible plume bypass around this end of the system. The TCE concentration in SP-16 increased from 3.5 µg/L to 120 µg/L between April 2008 and April 2009. In April 2010 the concentration increased to 250 µg/L. The 2010 Annual Report speculated that the 2010 and 2009 results might be attributed to a decrease in permeability and hydraulic conductivity of one or more of the ZVI gates due to accumulation of inorganic precipitates, which could cause part of the plume to flow around the end(s) of the funnel-and-gate system. However, more recent monitoring indicates the TCE concentration has been declining, to 43 µg/L in 2011, 14 µg/L in January 2012, and 9.3 µg/L in April 2012.

Six piezometers (PF-31B, PF-30B, PF-23B, PF-28B, PF-32B, and PF-33B) were installed along the eastern wing of the funnel-and-gate system in accordance with the 5-Year Review Work Plan to provide additional information for evaluating possible plume bypass. Very low to non-detect concentrations of VOCs were found in PF-31B, PF-30B, and PF-23B, located north of SP-16. PF-28B, located south of SP-16, contained 21 µg/L TCE, higher than 9.3 µg/L detected in SP-16 in April 2012. The TCE concentration in PF-33B, located outside the soil-bentonite wall further to the south, was even greater at 57 µg/L.

Collectively the available data indicate the changing concentrations of TCE at SP-16 may best be explained by a remnant slug of dissolved VOCs that moved past that well but has since tailed off. There is no indication that significant, sustained plume bypass is occurring around the northern end of the east wing of the funnel-and-gate system.

Additional piezometers also were installed in Tract F to better define the distribution of VOCs in the area inside the funnel-and-gate system. An examination of **Figures 4-10** and **4-11**, which map the distribution of PCE and TCE in the vicinity of Tract F, shows that VOCs are largely absent in the central part of

Tract F. PCE concentrations are highest in the southeast corner of Tract F (especially at PF-25B), and are greater than TCE concentrations. Conversely, TCE concentrations are highest near the northeastern corner of Tract F (PF-27B and PF-24B), where they exceed PCE values. Intrinsic biodegradation would tend to cause concentrations of PCE to decrease and the ratio of TCE to PCE to increase in downgradient directions. However, the opposite is seen, suggesting the possibility of a historically separate origin of VOCs in the southeast quadrant of Tract F.

4.3 South and Southeast Plume Delineation

As discussed in Sections 3.2 and 3.5, field investigations were performed to evaluate the funnel-and-gate system and delineate the extent of the dissolved plume of VOCs to the south and southeast of the active Facility. These investigations included installation and sampling of piezometers on farm property owned by the City of Coffeyville southeast of Tract F, and sampling of existing monitoring wells on AIW-owned property south of Tract F.

The extent of the dissolved plume of VOCs was further evaluated by sampling monitoring wells installed by others on AIW property south of Tract F, in addition to piezometers and monitoring wells installed during prior investigation of the Clean Harbors Facility. While PCE and TCE were detected in AIW-MW-13B, AIW-MW-17B, AIW-MW-13B, and AIW-MW-11B, VOCs were not detected in AIW-MW-16B and AIW-MW-15B, MW-30B, or PF-6B. The results suggest that the plume has generally been bounded to the south and west. The results of sampling MW-36B and MW-37B, both located on land southeast of Tract F owned by the City of Coffeyville, indicate the plume appears to be bounded to the east, although the extent of VOCs to the southeast has not been absolutely defined. Similar to within Tract F, a grouping of wells off-site to the south of the tract (including AIW-MW-13B and PF-14B) have higher measured PCE concentrations than TCE concentrations, suggestive of a different historical source.

4.4 Northwest Plume Delineation

As discussed in Sections 3.3 and 3.5, field investigations were performed to delineate the extent of the dissolved plume of VOCs northwest of the active Facility. In accordance with the 5-Year Review Work Plan, these investigations initially involved installation and sampling of two new monitoring wells in Tract D, MW-38B and MW-39B, to evaluate whether the plume could potentially be migrating off-site at levels exceeding MCLs. While VOCs were not detected in a sample from MW-38B, in MW-39B PCE and TCE were detected at 5.4 and 85 µg/L, respectively, above the MCLs for these constituents. Based on these results additional groundwater sampling was performed, with USEPA approval, using a direct-push Geoprobe rig to collect groundwater samples in Tract D and on off-site properties north of Tract D to determine the extent of the northwest plume.

As illustrated in **Figures 4-5**, **4-12**, and **4-13**, the plume of dissolved VOCs was found to extend off-site to the north of Tract D, with concentrations of 1,1-DCE, PCE, and TCE exceeding their MCLs of 7 µg/L, 5 µg/L, and 5 µg/L, respectively. The highest concentrations were detected in three samples (GW-30, GW-31, and GW-32) collected in the ROW of County Road 2600, which runs east-west along the northern edge of Tract D. A sample from GW-31 contained 1,060 µg/L TCE and 127 µg/L PCE.

A parcel owned by Roger and Cathy Robinson lies north of GW-31. A groundwater sample collected at GW-40, north of the house on this property, contained 417 µg/L TCE, 37.9 µg/L PCE, and 41.3 µg/L 1,1-DCE. A private water supply well is not present on the Robinson property; domestic water is provided by the Coffeyville municipal water system. The house does not have a basement.

An access agreement could not be obtained from the landowner of the 19.9-acre triangular-shaped property south and southwest of GW-30, GW-31, and GW-32. Groundwater samples collected from locations in Tract D just east of this property contained TCE ranging from non-detect in GW-24 to 38 µg/L in GW-20. No VOCs were detected in groundwater samples collected on Tract D west of this property and Big Hill Creek.

Surface water samples also were collected from five locations in Big Hill Creek and from four ponds located on property north of Tract D owned by Sherwood Construction Company. The results are presented in **Table 4-3**, which also includes the applicable Kansas water quality standards for Big Hill Creek. No VOCs were detected in the four pond water samples.

TCE and PCE were detected in three samples (SW-5, SW-8, and SW-9) collected from Big Hill Creek. The TCE concentration in SW-5, located between the Sherwood and Felts properties, exceeds the Kansas water quality standard of 2.7 µg/L, designated by USEPA for consumption of water and organisms. TCE was not detected in samples collected from Big Hill Creek upstream of this location. Samples collected downstream of SW-5 at locations SW-8 and SW-9 contained TCE at concentrations below the Kansas water quality standard.

The detection of TCE in Big Hill Creek is an indication that groundwater is discharging to the creek in this area. No VOCs were detected in a series of groundwater samples collected immediately west of the creek on Felts and Clean Harbors property, therefore the creek appears to function as a hydraulic barrier/interceptor for the northwest plume.

The distribution of measured TCE, and particularly PCE, concentrations complicate the contouring in the area of MW-38B in **Figures 4-5**, **4-12**, and **4-13**. The non-detect values at MW-38B, and the limited well locations showing higher values northeast or southwest of this well, may suggest the contours would be best drawn with a largely separate plume centered on the GW-30, GW-31, and GW-32 locations. The groundwater flow pattern is not definitively understood in this area, particularly given the indications of discharge to Big Hill Creek, therefore the northwest portion of the plume may not be as continuous as depicted.

4.5 1,4-dioxane

As discussed in Section 3.4, groundwater samples were collected at 26 sampling locations for analysis of 1,4-dioxane using EPA Method 8260 SIM to achieve detection limits below the current USEPA health-based action level of 6.1 µg/L. (USEPA Regions 3, 6, and 9 have calculated a screening level of 6.1 µg/L for 1,4-dioxane in tap water, based on a 1×10^{-6} lifetime excess cancer risk.) Sampling locations were selected at or close to the Facility boundary (perimeter wells), and where 1,1,1-TCA was detected during recent monitoring events, because 1,4-dioxane is known to have been used as a stabilizer for 1,1,1-TCA. Groundwater samples also were collected at other locations and analyzed for VOCs using the standard EPA Method 8260B, which has a much higher detection limit for 1,4-dioxane.

The highest 1,4-dioxane concentration (110 µg/L) was detected in MW-12B near the center of the operating Facility. A sample from MW-11B, located near MW-12B, contained 4.6 µg/L 1,4-dioxane. The only other location where a sample exceeded the USEPA action level was monitoring well M-8, which contained 13.6 µg/L. M-8 is located in Tract F downgradient of the Phase II Gate 2.

1,4-dioxane also was detected at monitoring locations a significant distance downgradient from the Clean Harbors operating facility. These include:

- MW-29BR (3.4 µg/L), located on the Bill Adams farm;
- MW-31B (2.7 µg/L), located north of MW-29BR in Tract D;
- MW-33B (2.6 µg/L), located in the northwest corner of Tract E;
- SP-16 (2.0 µg/L), located at the northeast corner of the funnel-and-gate; and
- MW-36B (1.0 µg/L), located on City of Coffeyville property southeast of Tract F.

Concentrations below 1.0 µg/L were detected in the Adams private water supply well, along the county road north of Tract D (GW-30, GW-31, and GW-32), and on private property north of the county road and Tract D (GW-40). The presence of 1,4-dioxane at greater distances from the operating facility than other

VOCs is consistent with its environmental properties. It is highly mobile and has not been shown to readily biodegrade in the environment.

4.6 Point-of-Use Carbon Adsorption System

An activated carbon filtration system is installed in the pump discharge line of the water supply well on the Adams farm (sample location Adams-A). This well is used for livestock and yard watering only. It is not used for domestic use or consumption because the farm house is connected to the Coffeyville municipal water system. The carbon adsorption system functions as a point-of-use treatment system should VOCs reach the wellhead.

The 2012 analytical results for samples collected from the Adams well are presented in **Table 4-2**. **Table 4-5** summarizes results for samples taken from the well, between the carbon canisters, and downstream of the canisters. Trace concentrations of several chlorinated compounds were detected in the Adams well in 2012, similar to the results from 2011. However, no VOCs were detected in water samples collected between the two carbon canisters. While low concentrations of several VOCs are present in the Adams private well, the concentrations are below health-based limits, and the activated carbon POU system effectively removes the VOCs to non-detect levels.

4.7 Pump-and-Treat System Monitoring

The existing pump-and-treat system located at the Facility was originally installed as an interim measure. The pump-and-treat system is maintained as a contingency measure in case it is needed. It also has been used for treatment of purge water generated by annual groundwater monitoring events, although purge water is now shipped off-site for disposal at another Clean Harbors facility. Discharge of groundwater treated in the pump-and-treat system was governed by a National Pollutant Discharge Elimination System (NPDES) permit issued by Kansas Department of Health and Environment (KDHE). The NPDES permit required monthly sampling of the treated water discharge. The permit was inactivated in 2011 after Clean Harbors decided to discontinue on-site treatment of purge water.

5.0 Funnel-and-Gate Hydraulic Analysis

5.1 Potentiometric Surface Analysis

Water levels were measured in 97 wells and piezometers on February 23, 2012, in the vicinity of the Facility. The measured depths to water and corresponding elevations are presented in **Table 4-1**. These measurements were used to construct **Figure 4-1**, a groundwater elevation (potentiometric surface) contour map. Lines of equal elevation were drawn to assist in the evaluation of local groundwater flow characteristics.

Historical water level data in and around the PRB funnel-and-gate system were compiled and evaluated to discern any possible trends in hydraulic gradient across each gate. This could provide an indirect indication of potential fouling over time that could reduce the flow of groundwater through each gate and impact hydraulic performance (i.e., capture) of the system. A review of historical groundwater elevation contour maps from previous annual reports did not identify changes in the data consistent with potential fouling of the gates that would negatively affect their hydraulic performance.

5.2 Groundwater Velocity Analysis

Degradation of contaminants in a ZVI PRB is not instantaneous; therefore the residence time in the PRB affects the degree to which susceptible groundwater contaminants (e.g., PCE, TCE) are degraded. The PRBs were designed to provide sufficient residence time to reduce chlorinated VOC concentrations to target concentrations (i.e., MCLs). While ZVI undergoes corrosion over time, the original mass of ZVI was much greater than the rate of loss through corrosion reactions; therefore corrosion is not considered a significant factor in limiting ZVI PRB longevity. Of greater concern is the accumulation of inorganic precipitates in the PRBs that is expected due to ZVI induced redox reactions and resulting elevated pH. As precipitates accumulate over time, it is possible that the PRB media porosity and hydraulic conductivity could decrease; resulting in reduced groundwater flow and a reduction in the overall capture effectiveness of the funnel-and-gate system. Reduced groundwater flow may manifest itself in lower groundwater flow velocities, therefore measurement of flow velocities within the PRBs can provide useful information on potential PRB fouling and resultant reduced groundwater flow.

A hydrodynamic analysis of a PRB is complicated by heterogeneous flow, which can be caused by several factors such as differential compaction of the ZVI and ZVI/sand mixtures, development of corrosion products on reactive medium surfaces, and precipitation of secondary minerals in the interstitial pore space. Heterogeneous flow also is caused by sharp conductivity differences between the aquifer and reactive gate media. Heterogeneity can decrease the overall effectiveness of the PRB by accelerating flow along preferential pathways and thus decreasing contact time between the groundwater and reactive medium. Heterogeneity also increases hydrodynamic dispersion, which can promote breakthrough of contaminants. Due to the spatial and temporal variations, the field-estimated residence time is actually a range, rather than a single value. The resulting uncertainty in residence time can be reduced by making more precise estimates of the parameters used to determine flow velocity as well as residence time.

To support the analysis of the continued effectiveness of the three PRBs, key hydrogeological parameters were estimated using a variety of field tests, including:

- Determination of hydraulic conductivity at multiple points in each PRB using pneumatic slug testing;
- Calculation of groundwater velocity using measured hydraulic conductivities (K) and measured gradients;

- Direct groundwater velocity measurements using borehole dilution tests; and
- Direct groundwater velocity measurements using PFMs.

5.2.1 Velocity Determination Using Pneumatic Slug Tests

Pneumatic slug tests were performed on monitoring wells in each PRB to estimate hydraulic conductivity. All accessible monitoring wells were tested. The purpose of these tests was to determine the permeability of the PRB gate and whether or not the ZVI PRBs had lost permeability due to inorganic mineral precipitation since they were installed in 1996 (Phase I Gate) and 1999 (Phase II gates 1 and 2).

Slug tests were performed in the following PRB wells:

- Phase I Gate: IW-1;
- Phase II Gate 1: IW1-1, IW1-2, IW1-3, IW1-4, IW1-5, IW1-6, IW1-7, and IW1-8; and
- Phase II Gate 2: IW2-1, IW2-2, IW2-3, IW2-4, IW2-5, IW2-6, IW2-7, IW2-8, IW2-9, IW2-10, and IW2-11.

Plots of pressure versus time for the testing of these wells are included in **Appendix B, Figures B1** through **B5**. These plots give an indication of whether or not a test was successful. If the water level failed to return to the pretest level in a reasonable time, then the test was deemed to have failed. For example, the plot of IW2-10 (**Appendix B, Figure B-5**), a monitoring well in Phase II Gate 2, indicates the water level failed to return to its pretest level after approximately 1 day, therefore indicating that water flow into this well was highly restricted.

The IW-1 well in the Phase I Gate was successfully tested. The wells tested in Phase II Gate 1 included IW1-1 through IW1-8. Of these eight wells, the tests of wells IW1-1 and IW1-6 failed because of a lack of water level response. The wells tested in Phase II Gate 2 included IW2-1 through IW2-11. Of these 11 wells, tests at wells IW2-5 and IW2-10 failed because of a lack of water level response. Specifically, water did not reenter the well sufficiently during the test, meaning either the well screen was clogged or the permeability immediately surrounding the well has declined over time.

The test data for all wells that exhibited adequate water level responses during testing were analyzed using the Bouwer-Rice method (Bouwer 1989; Bouwer and Rice 1976; Butler 1998). The Bouwer-Rice method is a semi-analytical method for the analysis of an over-damped slug test in a fully or partially penetrating well in an unconfined aquifer. The Bouwer-Rice method employs a quasi-steady-state model that ignores elastic storage in the aquifer, and includes the following assumptions:

- Aquifer has infinite areal extent;
- Aquifer is homogeneous and of uniform thickness;
- Test well is fully or partially penetrating;
- Aquifer is unconfined;
- Flow to well is quasi-steady-state (storage is negligible); and
- Volume of water, V, is instantaneously injected into or discharged from the well.

The resulting analysis is included in **Appendix B. Table B-1** summarizes the results for the wells where pneumatic slug testing was performed. Only one well, IW-1, could be tested in the Phase I Gate. The resulting estimate for K is 2.1 ft/day, indicating a potential loss of permeability over time. This gate is three years older than the other two PRBs, and was constructed using 100 percent ZVI, not a mixture of sand and iron, so it may be more prone to permeability loss due to accumulation of precipitates than the other two PRBs.

Hydraulic conductivities (Ks) from the successful tests for Phase II Gate 2 ranged from 2.8 to 489 ft/day with a geometric mean of 64 ft/day. It should be noted that when analyzing the spatial distribution of Ks, it is more appropriate to use the $\log_{10}$ of the value rather than the value itself (Gavaskar 2000a). Hence, the geometric mean is used to estimate the mean of K and the $\log_{10}$ Ks are included in **Appendix B, Table B-1**. The spatial distribution of K in Phase II Gate 2 as shown in **Figure B-6** appears to suggest a lowering of K near the upgradient edge of the gate. For instance, at IW2-3 and IW2-4 the Ks are 2.8 and 23 ft/day and at IW2-5 there was no response, indicating the well or aquifer is clogged. The Ks more distant from the upgradient edge range from 82 to 489 ft/day, which is more typical for a mixture of sand and ZVI (note this does not hold true at IW2-10, which appears clogged).

Ks for successful tests in Phase II Gate 1 ranged from 12 to 80 ft/day, with a geometric mean of 42 ft/day. Again, the spatial distribution of K in this gate, as shown in **Figure B-7**, suggests a lowering of K near the upgradient edge of the gate. For instance, at IW1-7 the K is 18 ft/day, at IW1-2 the K is 12 ft/day, and at IW1-8 and IW1-1 the wells appear clogged. The Ks more distant from the upgradient edge of the gate at IW1-4, IW1-5, and IW1-3 range from approximately 70 to 80 ft/day (note this does not hold true at IW1-6, which appears clogged).

To summarize, the results of pneumatic slug testing suggest a large range in K and a loss of permeability over time. Variations due to media heterogeneity and sharp contrasts in K between reactive media and aquifer sediments have been observed at most sites (Gavaskar 2000a). The large range in K suggests heterogeneous flow, which can be caused by several factors, such as differential compaction of the reactive medium, development of corrosion products on reactive medium surfaces, and precipitation of secondary minerals in the interstitial pore space. Since slug testing was not performed immediately after the installation of the PRBs, the conclusion of permeability loss cannot be definitively proved. The lower values of K are still, however, in the range of sand. For instance, the estimated K of 2.1 ft/day at IW-1 in the Phase I Gate has a permeability expected for clean sand (Todd and Mays 2005). Therefore, while these tests appear to indicate some loss of K over time in the upgradient part of the gates, the loss does not yet appear sufficient to significantly inhibit the operation of the PRBs.

<u>Groundwater Velocity Calculation</u>

A common approach for calculation of flow velocity through a PRB uses Darcy's Law. For example, this approach has been used for velocity determination at Dover Air Force Base (Gavaskar 2000b), as well as the former Naval Air Station Moffett Field (Reeter, 1998). Darcy's Law requires measuring water elevations and estimating the porosity and permeability of the reactive cell medium. For the Coffeyville Facility, groundwater gradients were determined by measuring groundwater elevation in and around the three PRBs and calculating hydraulic gradients across each one. These data, along with the estimate of Ks from the pneumatic slug tests and an estimate of porosity, provide an estimate of groundwater velocity at each gate.

Groundwater gradients were measured in December 2011, January 2012, and a comprehensive groundwater water level survey was conducted in February 2012 (**Figure 4-1**). Groundwater contour maps for each gate are presented in **Figures B-8, B-9**, and **B-10**. The flow through the Phase I Gate and Phase II Gate1 are similar, in that groundwater flows in a southwesterly direction, at an angle to the gates. Flow through the Phase II Gate 2 is perpendicular to the gate. The measured gradient across each gate is:

- 0.01 ft/ft through Gate 1, Phase II PRB;
- 0.004 ft/ft through Gate 2, Phase II PRB; and
- 0.032 ft/ft through Gate 1, Phase I PRB.

Porosity had to be estimated because it could not be measured directly. Experience at similar sites has shown that the actual porosity of the reactive media may initially be as high as 0.7 (Gavaskar 2000a). With time, the porosity of the PRB can decrease due to a variety of causes including: deferential compaction of the PRB material, precipitation of $Fe(OH)_2$, $FeCO_3$, and $CaCO_3$, and entrapment of a film of H_2 gas at the iron surface (Mackenzie et al. 1999). The appearance of calcium carbonate depends on the carbonate content of the groundwater. For this site, Envirometal Technologies, Inc. (ETI) (former licensor of the technology) made estimates of the initial porosity and predicted loss of porosity with time based on a pilot-scale study. A calcium loss of 120 mg/L across the reactive media was measured in the pilot-scale test. According to ETI, the PRBs were expected to have an annual porosity loss of 5 to 10 percent per year over the first few inches of the PRB, and less than 1 percent per year in the remainder of a gate.

Samples of the ZVI and ZVI-sand media, respectively, were collected from borings drilled in the Phase I Gate on January 11, 2012, and Phase II Gate 1 on January 10, 2012. The boring in the Phase I Gate was approximately midway between the upgradient and downgradient faces of the ZVI. The boring in Phase II Gate 1 was several feet downgradient of the leading edge of the PRB, between IW1-1 and IW1-2. No visual signs of significant mineral precipitation were observed (see **Figure 3-4**).

Based on the analysis done by ETI, the predicted porosity is estimated to have decreased from an initial value of 0.7 to 0.22 at both Phase II PRBs. At the Phase I Gate, porosity is estimated to have decreased to 0.15, because it is older than the other two gates.

The spatial distribution of groundwater velocity is shown to be highly variable on and for Phase II Gate 1 (**Figure B-11**) and Phase II Gate 2 (**Figure B-12**). Data were obtained from multiple pneumatic slug tests for both PRBs; therefore a spatial distribution of velocity could be calculated. At the Phase I Gate, the velocity calculated at 0.45 ft/day, based on the results of one pneumatic slug test.

At Phase II Gate 1, (**Figure B-11**), velocity is estimated to range from 0.0036 ft/day to 3.63 ft/day, with a geometric mean of 1.09 ft/day and a standard deviation of 0.73 ft/day. At Phase II Gate 2 (**Figure B-12**), velocity is estimated to range from 0.004 ft/day to 8.87 ft/day, with a geometric mean of 1.78 ft/day and a standard deviation of 1.38 ft/day. The spatial distribution of velocity is consistent with the distribution of K; therefore the conclusions are similar. Namely, while velocity appears to have decreased over time at the upgradient portion of the gates, the loss does not yet appear sufficient to prohibit overall function of the PRB.

<u>Residence Time Calculation</u>

A mean residence time was calculated for each PRB using the geometric mean velocity and the thickness of reactive material measured in the direction of groundwater flow, which varied from 3 feet in the Phase I Gate to 12 feet in the Phase II gates. Using geometric mean velocities, the calculated mean residence times are:

- 6.7 days through the Phase I Gate;
- 11 days through Phase II Gate 1; and
- 6.7 days through Phase II Gate 2.

Based on bench-scale testing using site groundwater (SECOR 1995), the site-specific, first-order reaction rate (half-life) for reductive dechlorination is approximately 1 hour. Assuming this half-life and an MCL of 5 µg/L for PCE and TCE, the PRBs would be capable of treating 1,000 µg/L PCE or TCE to the MCL in approximately 8.3 hours. Since the highest influent concentration into any of the three gates in April 2012 was 130 µg/L PCE and 110 µg/L TCE (both in M-5, upgradient of Phase II Gate 1), the calculated mean residence times should be more than adequate to reduce influent concentrations to MCLs.

5.2.2 Velocity Determination Using PFMs

Passive flux meters, or PFMs, supplied by EnviroFlux, LLC were placed in the following wells to measure groundwater flux, and hence, groundwater velocity:

- Phase I Gate: M-10, M-11;
- Phase II Gate 1: IW-5; and
- Phase II Gate 2: IW2-3, IW2-4.

PFMs were retrieved from all test wells and analyzed, except for IW2-3, where the attached cable failed during retrieval. Each PFM consisted of two 5-foot-long vertical sections to determine velocity in two discrete vertical zones at each test location.

Samples were collected from each PFM and analyzed to determine the extent of tracer depletion during emplacement in the test wells. The amount of tracer lost is a function of the groundwater velocity through each PFM. Samples of the PFM sorbent were extracted to quantify the mass of resident tracer remaining. The results were reported by EnviroFlux as Darcy velocities (more appropriately termed specific discharge), and are not true velocities. To calculate true velocity, specific discharge is divided by effective porosity. (Assuming an initial porosity of 0.7 and a 10 percent per year porosity loss, the estimated porosities would be approximately 15 percent in the Phase I Gate [installed in 1996] and approximately 22 percent in Phase II gates 1 and 2 [installed in 1999].)

The results are summarized in the EnviroFlux, LLC report (**Appendix B**), and shown in **Figure B-13**. The overall data set indicate a remarkably uniform velocity through all three gates with a minimum velocity of 0.36 ft/day at the lower interval of IW2-4 in Phase II Gate 2, and a maximum velocity of 0.81 ft/day at the lower interval of M-10 in the Phase I Gate. The average velocity through all three gates is 0.52 ft/day, with a standard deviation of 0.14 ft/day. Duplicates analyzed at each PFM indicate the analytical methods are precise, as there was very little variation in the results. The velocities measured in the upper and lower PFM intervals indicate a fairly uniform vertical velocity distribution through each PRB (**Figure B-13**).

The velocities obtained using PFMs are lower than estimated during the design of these gates, which ranged between 3 and 5 ft/day based on the site-specific numerical groundwater model. Given the inherent uncertainty in model estimates, groundwater velocity appears to have decreased through the gates since installation. While the decrease in velocity could be almost an order of magnitude, the measured velocities through each gate appear sufficient to not cause significant hydraulic performance issues such as mounding or flow diversion upgradient of the gates. However, velocity reductions will continue over time, eventually impacting the effectiveness of the funnel-and-gate system without replacement or rehabilitation of the PRBs.

5.2.3 Velocity Determination Using Borehole Dilution Tests

The borehole point dilution test method also was used to directly measure the velocity in the PRBs (Freeze and Cherry 1979; Gaspar 1987; Lamontagne et al. 2002). This test method involves the following simplifying assumptions (Lamontagne et al. 2002):

- Groundwater flow is steady during the test;
- Mixing of the tracer in the well is homogeneous;
- Known distortion of the flow field around the well (i.e., well-shape factor);

- The tracer does not induce density gradients; and
- The well-mixing mechanism does not increase the rate at which the tracer moves out of the well (Gaspar 1987; Halevy et al. 1967).

Borehole dilution tests were attempted in three Phase II Gate 1 wells: IW1-8, IW1-3, and IW1-5, although only the test in IW1-5 was successful. At IW1-8, injection of the tracer increased the electrical conductivity approximately five times background, but the conductivity did not decrease after 4.5 hours, when the test was terminated due to darkness. The results suggested the well or aquifer immediately surrounding the well has a very low K, and is essentially impermeable. Subsequent testing with the pneumatic slug test apparatus confirmed this result.

At IW1-3, groundwater electrical conductivity was increased approximately 18 percent, from approximately 687 to 811 mS/cm, using two separate tracer injections. However, the conductivity did not decrease after 5 hours, when the test was suspended due to darkness. The pneumatic slug testing at this well indicated the aquifer is permeable at this location. What appears to have occurred is that excess tracer solution was injected into the media surrounding the well, and 5 hours was insufficient to measurably decrease the conductivity in the well.

The borehole dilution test was successful at IW1-5, with conductivity increasing to approximately 27 percent above background at the start of the test, and then steadily decreasing over the next 10 hours. **Figure B-14** plots electrical conductivity in μS/cm over the course of the test.

The appropriate initial time (t_o) and initial conductivity (EC_m) for the dilution test are arbitrary because in theory, any point along the curve can be used (Gaspar 1987). However, it is preferable to choose as early as possible during the test because the departures of the test curves relative to theoretical curves can be used to diagnose potential artifacts during the test. For this test, the straight line portion of the graph (**Figure B-14**) is used with an initial elapsed time (t_o) of 34 minutes and EC_m of 1,056 μS/cm, and a final elapsed time (t_f) of 260 minutes and EC_f of 882 μS/cm.

Two methods were used to determine velocity from the data displayed in **Figure B-13**. The first method is described in Drost et al. (1968); Freeze and Cherry (1979); and Halevy et al. (1967); and discussed below as the "analytical method." The second method is described in Lamontagne et al. (2002), discussed below as the "graphical method."

<u>Analytical Method</u>

The straight line portion of the graph in **Figure B-14** is used to obtain EC_m and EC_f at an initial and final time. These data, along with normalized values for EC (C/C_o), volume of the isolated well screen, cross sectional area, and a velocity correction factor (Freeze and Cherry 1979; Lamontagne et al. 2002) are used in the following equation (eq. 9.27 in Freeze and Cherry 1979):

$$-$$

where V* is the average apparent velocity.

The apparent groundwater velocity is the velocity of groundwater travelling through the well. This will differ from the "true" velocity of groundwater in the porous medium because of two factors. First, the hydraulic conductivity of the well is usually much greater than that of the surrounding porous medium, resulting in the well acting as a preferential flow path. Second, a correction must be included to account for the porosity of the porous medium. **Table B-2** presents the calculations and results, and includes the calculation of the correction (or shape) factor. Assuming an effective porosity of 0.22, and a correction factor of 2.1(Freeze and Cherry 1979; Lamontagne et al. 2002), the resulting velocity at well IW1-5 is 0.62 ft/day.

Graphical Method

A graphical method was also used to estimate velocity at IW1-5 (Lamontagne et al. 2002). A series of theoretical dilution curves were plotted along with the observed data from the point dilution test and shown in **Figure B-15**. Several such curves are plotted for different values of v* until a few reasonable matches are found to compare with the observed data. These characteristic curves provide an estimate of the apparent groundwater velocity and are generated using the following equation:

where v* = apparent velocity
A = cross section area of the well perpendicular to groundwater flow
V = volume of water in the test well and recirculation system

The observed data appear to most closely approximate the characteristic curve for an apparent velocity of 0.04 centimeter per minute (cm/min) in the early part of the test and 0.05 cm/min later in the test. Assuming a porosity of 0.22 and apparent velocity of 0.045 cm/min, this equates to a velocity of approximately 4 ft/day at IW1-5 (**Table B-2**), which is considerably higher than that obtained using the other methods.

In summary, two different field test methodologies were used to estimate the velocity of groundwater flowing through the PRBs. The method using PFMs gave a fairly tight range of estimates ranging from 0.36 ft/day to 0.81 ft/day in all tests. The borehole dilution test was only completed successfully in IW1-5 and produced two estimates of velocity (0.62 ft/day and 4 ft/day) using different data analysis methods. A comparison of all velocity estimates at IW1-5 indicates that both the PFM and the borehole dilution test analytical method provided consistent results: 0.37 to 0.67 ft/day for the PFM and 0.62 ft/day for the borehole dilution analytical method. The graphical method used to analyze the borehole point dilution data resulted in what appears to be a high estimate of velocity.

5.3 PRB Residence Time Calculations

The goal of the funnel-and-gate is to intercept a groundwater contaminant plume and prevent it from migrating to downgradient receptors. This involves capture of the plume of groundwater contaminants and transformation of target compounds (e.g., PCE and TCE) to less toxic compounds. The funnel-and-gate, therefore, has both hydraulic capture and reactivity functions. Implicit in the hydraulic capture function is the need to provide the contaminants with sufficient residence time in the PRBs for the desired reactions to occur. Since degradation of chlorinated VOCs in the PRBs is controlled by rate-dependent processes, residence time, therefore, affects the degree to which groundwater contaminants are degraded. Since the PRB geometries are fixed, residence time estimates can be derived using groundwater flow velocity measurements in the PRBs.

Based on the direct measurement of velocity with PFMs and borehole point dilution tests, the seepage velocity through the Phase I Gate is estimated to range from 0.41 to 0.81 ft/day. Given a thickness of 3 feet for the Phase I Gate, the residence time is estimated to range from 7.3 to 3.7 days. The seepage velocity through Phase II Gate 1 is estimated to range from 0.37 to 0.58 ft/day. This gate is 12 feet thick; therefore, the residence time is estimated at 32.4 to 20.7 days. The seepage velocity through Phase II Gate 2 is estimated at 0.36 to 0.47 ft/day. This gate also is 12 feet thick; therefore, the residence time is estimated to range from 33.3 to 25.5 days. As stated in Section 5.2.1, given a reaction half-life of 1 hour, the PRBs would be capable of treating 1,000 µg/L PCE or TCE to the MCL in approximately 8.3 hours. Therefore, even though flow velocities may have decreased through the PRBs, the residence times would be sufficient to achieve contaminant treatment goals, in the absence of a significant decrease in reactivity due to iron passivation caused by the precipitation of carbonate minerals.

6.0 Summary

Current concentrations of TCE exceed the interim on-site groundwater cleanup standard of 610 µg/L in six monitoring wells. Concentrations of PCE exceed the interim on-site standard of 8,360 µg/L in one well. However, the potential risk to on-site workers is effectively mitigated by ICs. All other constituents are below their interim cleanup standards. PCE and TCE concentrations in groundwater are expected to remain high in these areas due to the residual mass in the soils and slow back diffusion from the clay soil matrix.

The hydraulic conductivity of the funnel-and-gate PRBs appears to have decreased since construction of Phase I in 1996 and Phase II in 1999. The decreased hydraulic conductivity can be attributed to the accumulation of inorganic carbonate precipitates. However, groundwater continues to flow through the PRBs, and the groundwater plume does not appear to be bypassing the funnel-and-gate system.

Chlorinated VOCs continue to be treated in the PRBs. The reactivity of the PRB ZVI media appears to have decreased, likely due to passivation of the iron by inorganic precipitates, but the reactivity and residence time is still sufficient to address the contaminant concentrations observed upgradient of the PRBs.

The downgradient, off-site plume of dissolved VOCs in the vicinity of Tract F predates construction of the funnel-and-gate system. This off-site plume has not been significantly attenuated by intrinsic biodegradation, and is likely influenced by relatively oxidizing conditions and matrix back diffusion from shallow clayey soils. The nature of the plume to the south varies between PCE and TCE dominated contaminant concentrations. The dissolved plume of VOCs extending south and southeast of Tract F may not be completely bounded to the southeast.

The dissolved plume of VOCs in Tract D, northwest of the active Facility, has been delineated off-site and discharges to Big Hill Creek, which appears to function as a hydrologic boundary. The plume may not extend from the site exactly as depicted, as there is an area of low concentrations that may divide the plume. The interpreted groundwater flow direction is complicated by the absence of the more transmissive basal sand and gravel zone at some locations west of Tracts A/B and Highway 169. The surface water impacts in Big Hill Creek above Kansas surface water quality standards have been determined.

Potential groundwater impacts on private property east of Big Hill Creek and south of County Road 2600 are inferred, but could not be confirmed because legal access to this property could not be obtained. Groundwater grab samples collected west of this property and Big Hill Creek bound the western extent of groundwater impacts in this area.

7.0 References

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Tables

Table 2-1 On-site Soil Cleanup Levels

Chemical	Cleanup Standard (mg/kg)
1,1-Dichloroethene	29.48
Tetrachloroethene	1.82
Trichloroethene	0.15
Arsenic	27.27
Chromium^{+3}	8.15×10^5
Chromium^{+6}	64

mg/kg = milligrams per kilogram.

Table 2-2 Interim On-site Groundwater Cleanup Levels

Chemical	Cleanup Standard (mg/L)
Barium	425
Benzene	13.91
Cadmium	0.82
Carbon tetrachloride	1.71
Chlorobenzene	366.5
Chromium	594.74
1,2-Dichloroethane	15.41
1,1-Dichloroethene	186.95
cis-1,2-Dichloroethene	169.21
trans-1,2-Dichloroethene	175
Methylene chloride	409.03
Selenium	0.72
Tetrachloroethene	8.36
Trichloroethene	0.61
Vinyl chloride (VC)	4.68

mg/L = milligrams per liter.

Table 2-3 Final Off-site and On-site Groundwater Cleanup Levels

Chemical	Cleanup Standard (mg/L)
Barium	2
Benzene	0.005
Cadmium	0.005
Carbon tetrachloride	0.005
Chlorobenzene	0.1
Chloroform	0.08
Chromium	0.1
1,2-Dichloroethane	0.005
1,1-Dichloroethene	0.007
cis-1,2-Dichloroethene	0.07
trans-1,2-Dichloroethene	0.1
Methylene chloride	0.005
Tetrachloroethene	0.005
Trichloroethene	0.005
VC	0.002

Table 3-1 Groundwater Elevations - February 23, 2012

Location ID	Depth to Water (feet)	Groundwater Elevation (feet below MSL)
GW-1	10.17	725.35
GW-2	10.02	725.41
GW-3	9.07	726.28
GW-4	10.09	725.33
GW-5	9.91	725.3
GW-6	10.02	725.33
IW-1	10.09	725.28
IW1-1	6.93	730.97
IW1-2	12.01	725.99
IW1-3	12.72	725.26
IW1-4	12.5	725.27
IW1-5	12.46	725.28
IW1-6	12.33	725.53
IW1-7	12.55	725.5
IW1-8	8.71	728.95
IW-2	2.94	732.24
IW2-10	15.89	725.09
IW2-11	16.02	724.51
IW2-2	15.94	724.42
IW2-3	---	---
IW2-4	15.96	724.51
IW2-6	16.02	724.53
IW2-7	16.11	724.52
IW2-8	15.76	724.54
IW2-9	16.04	724.54
M-1	10.19	725.37
M-10	11.13	725.3
M-11	11.08	725.33
M-2	9.89	725.43
M-3	12.36	725.97
M-4	12.82	725.29
M-5	12.16	725.42
M-6	12.27	725.23
M-7	15.83	724.86
M-8	15.97	724.51
MW-10B	16.26	725.69
MW-11B	14.72	727.58
MW-12B	13.22	727.56
MW-13B	14.67	727.63
MW-14B	15.69	726.61
MW-18B	17.33	725.3
MW-19B	18.49	725.7
MW-1B	14	727.07
MW-20B	12.93	723.73
MW-21B	13	728.78
MW-22B	13.18	728.55
MW-24B	15.31	725.97
MW-25B	12.3	725.67
MW-26B	13.43	725.59

Location ID	Depth to Water (feet)	Groundwater Elevation (feet below MSL)
MW-28B	17.83	720.29
MW-29BR	4.06	724.18
MW-30B	15.54	724.32
MW-31B	5.93	723.53
MW-32B	15.83	724.06
MW-33B	11.92	726.5
MW-34B	13.2	722.33
MW-35BR	9.88	721.62
MW-36B	20.6	721.71
MW-37B	20.65	721.89
MW-38B	17.55	719.67
MW-39B	19.34	717.88
MW-3B	13.31	728.13
MW-4B	13.42	727.29
MW-5B	12.89	729.22
MW-6B	14.26	727.14
MW-7B	14.14	727.5
MW-8B	13.32	727.18
MW-9B	16.03	726.24
PE-2B	10.63	726.59
PE-4B	---	---
PF-20B	14.39	725.39
PF-21B	14.97	725.15
PF-22B	14.08	725.13
PF-23B	15.46	724.97
PF-24B	14.04	727.59
PF-25B	15.32	724.92
PF-26B	15.41	724.83
PF-27B	15.87	724.81
PF-28B	15.02	724.81
PF-29B	15.88	724.86
PF-30B	16.45	725.23
PF-31B	16.8	726.17
PF-32B	16.32	723.87
PF-33B	14.9	724.47
PF-9B	15.9	724.56
SP-10	12.04	725.33
SP-11	12.14	725.16
SP-12	14.34	725.02
SP-13	15.58	724.61
SP-14	15.44	724.45
SP-15	15.74	724.5
SP-16	15.66	724.82
SP-2	12.22	725.4
SP-4	11.43	725.38
SP-5	---	---
SP-6	11.38	725.33
SP-9	12.55	725.25

MSL = mean sea level

Table 4-1 Onsite Groundwater Analytical Results

Chemical Name	Unit	Location ID	GW-2	GW-20	GW-21	GW-22	GW-23	GW-24	GW-25	GW-26	GW-27	GW-28	GW-29	GW-29	GW-33	GW-34	GW-35	GW-36	GW-37	GW-38	GW-39	GW-5	GW-50	GW-51	GW-65	GW-66	GW-67	GW-68	GW-68	IW-1
		Sample Date	04/26/2012	05/02/2012	05/02/2012	05/02/2012	05/02/2012	05/02/2012	05/03/2012	05/03/2012	05/03/2012	05/03/2012	05/03/2012	05/03/2012	10/24/2012	10/23/2012	10/23/2012	10/23/2012	10/23/2012	10/24/2012	10/24/2012	04/26/2012	01/08/2013	01/08/2013	01/10/2013	01/10/2013	01/10/2013	01/10/2013	01/10/2013	04/26/2012
		N/FD	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
		Type	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Mobile Lab	Mobile Lab	Mobile Lab	Mobile Lab	Mobile Lab	Fixed Lab	Mobile Lab	Fixed Lab
		Interim Onsite Cleanup Level																												
FIELD																														
Dissolved Oxygen, Field	ppm		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oxidation-Reduction Potential, Field	mV		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, Field	std units		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Specific Conductivity, Field	us/cm		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature, Field	deg c		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
INORGANICS																														
Alkalinity, Total (as CaCO3)	mg/L		350	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	76	--	--	--	--	--	--	--	370
Calcium	ug/L		240000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5900	--	--	--	--	--	--	--	6300
Chloride	mg/L		100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--	--	--	84
Iron	mg/L		4.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.47	--	--	--	--	--	--	--	3
Magnesium	mg/L		55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--	--	--	--	--	0.96
Potassium	mg/L		2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.3	--	--	--	--	--	--	--	15
Sodium	mg/L		230	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	220	--	--	--	--	--	--	--	230
VOCS																														
1,1,1,2-Tetrachloroethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
1,1,1-Trichloroethane	ug/L		0.75	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	36	2.7	2.6	< 0.50	22	18	< 1.0
1,1,2,2-Tetrachloroethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
1,1,2-Trichloroethane	ug/L		0.65	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0
1,1-Dichloroethane	ug/L		9.2	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.9	< 0.50	13	1.6	6.8	< 0.50	7.0	6.7	< 1.0
1,1-Dichloroethene	ug/L	186,950	18	3.9	< 10	< 2.0	< 1.0	< 1.0	0.57	0.67	< 1.0	< 1.0	2.5	1.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	72	7.5	14	< 0.50	22	17	< 1.0
1,1-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L		< 2.5	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.5	--	--	--	--	--	< 2.5	--	< 2.5
1,2,4-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L		< 5.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	< 5.0	--	< 5.0
1,2-Dibromoethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
1,2-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	15,410	1.6	< 4.0	< 10	< 2.0	< 1.0	< 1.0	0.44	0.59	< 1.0	< 1.0	< 4.0	0.82	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.4	< 0.50	< 0.50	< 0.50	1.4	< 0.50	< 1.0	< 0.50	0.84
1,2-Dichloroethene (total)	ug/L		150	< 8.0	< 20	3.8	1.7	< 2.0	4.6	7.3	4.7	< 2.0	14	13	--	--	--	--	--	--	--	1.3	--	--	--	--	--	3.4	--	< 1.0
1,2-Dichloropropane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
1,3,5-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L		< 200	< 160	< 400	< 80	< 40	< 40	< 40	< 40	< 40	< 40	< 160	< 40	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 200	--	--	--	--	--	< 200	--	< 200
1,4-Dioxane (SIM)	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L		< 6.0	< 40	< 100	< 20	< 10	< 10	< 10	< 10	< 10	< 10	< 40	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 6.0	--	--	--	--	--	< 6.0	--	< 6.0
2-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L		< 5.0	< 20	< 50	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 20	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	< 5.0	--	< 5.0
4-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L		< 5.0	< 20	< 50	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 20	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	< 5.0	--	< 5.0
Acetone	ug/L		< 10	< 40	< 100	< 20	< 10	< 10	< 10	< 10	< 10	< 10	< 40	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	--	--	--	--	--	< 10	--	720
Acetonitrile	ug/L		< 30	< 160	< 400	< 80	< 40	< 40	< 40	< 40	< 40	< 40	< 160	< 40	--	--	--	--	--	--	--	< 30	--	--	--	--	--	< 30	--	< 30
Acrolein	ug/L		< 20	< 80	< 200	< 40	< 20	< 20	< 20	< 20	< 20	< 20	< 80	< 20	--	--	--	--	--	--	--	< 20	--	--	--	--	--	< 20	--	< 20
Acrylonitrile	ug/L		< 20	< 20	< 50	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 20	< 5.0	--	--	--	--	--	--	--	< 20	--	--	--	--	--	< 20	--	< 20
Allyl chloride	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	--	--	--	--	--	--	--	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Benzene	ug/L	13,910	< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.57	< 4.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	--	--	--	--	--	0.31	--	< 1.0
Bromobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Bromoform	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Bromomethane	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Carbon Disulfide	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Carbon tetrachloride	ug/L	1,710	< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Chlorobenzene	ug/L	366,500	< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Chloroethane	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Chloroform	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Chloromethane	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Chloroprene	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	--	--	--	--	--	--	--	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
cis-1,2-Dichloroethene	ug/L	169,210	150	< 4.0	< 10	3.8	1.7	< 1.0	4.6	7.3	4.7	< 1.0	14	13	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.3	0.95	8.6	1.1	8.8	< 0.50	3.4	2.9	< 1.0
cis-1,3-Dichloropropene	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Dibromochloromethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Dibromomethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Dichlorodifluoromethane	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Ethyl methacrylate	ug/L		< 3.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	--	--	--	--	--	--	--	< 3.0	--	--	--	--	--	< 3.0	--	< 3.0
Ethylbenzene	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	0.17	--	< 1.0
Hexachloro-1,3-butadiene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Iodomethane	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
Isobutyl alcohol	ug/L		< 110	< 160	< 400	< 80	< 40	< 40	< 40	< 40	< 40	< 40	< 160	< 40	--	--	--	--	--	--	--	< 110	--	--	--	--	--	< 110	--	< 110
Isopropylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L		< 10	< 20	< 50	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 20	< 5.0	--	--	--	--	--	--	--	< 10	--	--	--	--	--	< 10	--	< 10
Methyl methacrylate	ug/L		< 4.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	--	--	--	--	--	--	--	< 4.0	--	--	--	--	--	< 4.0	--	< 4.0
Methyl tert-butyl ether	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	409,030	0.72	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	1.2	--	--	--	--	--	< 2.0	--	0.99
Naphthalene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
o-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Propionitrile	ug/L		< 20	< 40	< 100	< 20	< 10	< 10	< 10	< 10	< 10	< 10	< 40	< 10	--	--	--	--	--	--	--	< 20	--	--	--	--	--	< 20	--	< 20
sec-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Styrene	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	--	--	--	--	--	< 1.0	--	< 1.0
tert-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	8,360	2.1	6.6	< 10	< 2.0	1.2	< 1.0	3.5	2.0	6.5	< 1.0	< 4.0	0.96	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	380	4.1	14	< 0.50	18	7.1	< 1.0
Toluene	ug/L		< 1.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.56	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	0.63	--	< 1.0
trans-1,2-Dichloroethene	ug/L	175,000	< 4.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0
trans-1,3-Dichloropropene	ug/L		< 3.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 3.0	--	--	--	--	--	< 3.0	--	< 3.0
trans-1,4-Dichloro-2-butene	ug/L		< 3.0	< 20	< 50	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 20	< 5.0	--	--	--	--	--	--	--	< 3.0	--	--	--	--	--	< 3.0	--	< 3.0
Trichloroethene	ug/L	610	50	38	31	35	23	< 1.0	68	71	86	1.4	130	130	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	840	76	61	2.5	190	96	< 1.0
Trichlorofluoromethane	ug/L		< 2.0	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	--	--	--	--	--	< 2.0	--	< 2.0
Vinyl Acetate	ug/L		< 3.0	< 20	< 50	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 20	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 3.0	--	--	--	--	--	< 3.0	--	< 3.0
Vinyl chloride	ug/L	4,680	5.3	< 4.0	< 10	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.8	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0
Xylenes, total	ug/L		< 1.0	< 8.0	< 20	< 4.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 8.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	0.19	--	< 1.0

Table 4-1 Onsite Groundwater Analytical Result

		Location ID	IW1-2	IW1-5	IW2-10	IW2-5	IW2-7	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-8	MW-10B	MW-11B	MW-11B	MW-11B	MW-11B	MW-12B	MW-12B	MW-13B	MW-20B	MW-21B	MW-24B	MW-26B	MW-28A	MW-28B
		Sample Date	04/27/2012	04/27/2012	04/26/2012	04/26/2012	04/26/2012	04/26/2012	04/26/2012	04/24/2012	04/24/2012	04/27/2012	04/27/2012	04/26/2012	01/10/2012	04/26/2012	04/25/2012	12/16/2011	12/16/2011	04/25/2012	04/25/2012	04/25/2012	04/25/2012	04/25/2012	04/24/2012	04/23/2012	04/25/2012	04/24/2012	04/22/2012	01/09/2012
		N/FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	FD	N	FD	N	FD	N	N	N	N	N	N	N
		Type	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab
Chemical Name	Unit	Interim Onsite Cleanup Level																												
FIELD																														
Dissolved Oxygen, Field	ppm		--	--	--	--	--	--	--	--	--	--	--	--	1.43	--	--	2.51	--	--	--	--	--	--	--	--	--	--	--	1.12
Oxidation-Reduction Potential, Field	mV		--	--	--	--	--	--	--	--	--	--	--	--	118.1	--	--	6.8	--	--	--	--	--	--	--	--	--	--	--	-57.62
pH, Field	std units		--	--	--	--	--	--	--	--	--	--	--	--	6.3	--	--	6.84	--	--	--	--	--	--	--	--	--	--	--	7.34
Specific Conductivity, Field	us/cm		--	--	--	--	--	--	--	--	--	--	--	--	3428000	--	--	4001	--	--	--	--	--	--	--	--	--	--	--	742000
Temperature, Field	deg c		--	--	--	--	--	--	--	--	--	--	--	--	15.3	--	--	16.1	--	--	--	--	--	--	--	--	--	--	--	15.59
INORGANICS																														
Alkalinity, Total (as CaCO3)	mg/L		210	120	450	520	270	430	300	--	--	360	370	410	--	410	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/L		66000	7800	100000	8300	5800	180000	190000	--	--	190000	200000	490000	--	470000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L		17	110	7.5	270	380	60	97	--	--	51	64	420	--	400	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/L		0.59	4.9	18	19	4.9	3	9.1	--	--	23	23	1.2	--	3.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/L		7.9	1.3	22	7.6	0.71	34	45	--	--	43	40	150	--	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	mg/L		1.3	8.8	2.1	9.5	12	1.4	2.3	--	--	3.4	3.5	3.4	--	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/L		46	110	90	400	330	170	170	--	--	170	180	430	--	400	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCS																														
1,1,1,2-Tetrachloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,1,1-Trichloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.8	< 1.0	< 1.0	< 1.0	11	6.4	7.6	< 1.0	--	--	2.5	3.1	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,1,2,2-Tetrachloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,1,2-Trichloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,1-Dichloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.9	2.8	3.2	< 1.0	< 1.0	0.32	21	14	14	< 1.0	--	--	3.4	3.3	88	97	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,1-Dichloroethene	ug/L	186,950	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	8.1	3.6	7.4	< 1.0	0.52	0.50	33	22	23	< 1.0	--	--	25	23	76	78	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,1-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L		< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 1.0	< 1.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,2,4-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,2-Dibromoethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,2-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	15,410	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.73	0.88	1.2	< 1.0	2.9	4.5	< 1.0	0.16	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	3300	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,2-Dichloroethene (total)	ug/L		< 1.0	2.9	< 1.0	< 1.0	1.6	49	59	11	< 2.0	220	67	1.8	4.4	3.5	11	--	--	110	100	9800	8800	85	1.6	1.2	10	1.4	< 2.0	--
1,2-Dichloropropane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
1,3,5-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L		< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 40	< 40	< 200	< 200	< 200	< 200	< 200	< 40	--	--	< 40	< 40	110	< 800	< 400	< 40	< 40	< 40	< 40	< 40	--
1,4-Dioxane (SIM)	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	13.6	--	--	4.6	4.6	--	--	--	--	--	--	--	--	--	--	0.40
2,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L		< 6.0	< 6.0	< 6.0	< 6.0	9.2	< 6.0	< 6.0	< 10	< 10	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 10	--	--	< 10	< 10	< 10	< 200	< 100	< 10	< 10	< 10	< 10	< 10	--
2-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	< 5.0	< 5.0	< 5.0	< 100	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--
4-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	< 5.0	< 5.0	< 5.0	< 100	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--
Acetone	ug/L		< 10	20	< 10	< 10	51	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	--	--	< 10	< 10	< 10	< 200	< 100	< 10	< 10	< 10	< 10	< 10	--
Acetonitrile	ug/L		< 30	< 30	< 30	< 30	< 30	< 30	< 30	< 40	< 40	< 30	< 30	< 30	< 30	< 30	< 40	--	--	< 40	< 40	< 40	< 800	< 400	< 40	< 40	< 40	< 40	< 40	--
Acrolein	ug/L		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	--	--	< 20	< 20	< 20	< 400	< 200	< 20	< 20	< 20	< 20	< 20	--
Acrylonitrile	ug/L		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 5.0	< 5.0	< 20	< 20	< 20	< 20	< 20	< 5.0	--	--	< 5.0	< 5.0	< 5.0	< 100	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--
Allyl chloride	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Benzene	ug/L	13,910	< 1.0	0.32	< 1.0	< 1.0	0.34	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	0.59	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Bromobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Bromoform	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Bromomethane	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Carbon Disulfide	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Carbon tetrachloride	ug/L	1,710	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	7.6	7.5	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Chlorobenzene	ug/L	366,500	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	1.3	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Chloroethane	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	15	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Chloroform	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	4.0	4.3	5.3	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Chloromethane	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Chloroprene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
cis-1,2-Dichloroethene	ug/L	169,210	< 1.0	2.9	< 1.0	< 1.0	1.6	49	58	11	< 1.0	200	65	1.8	4.4	3.5	11	--	--	110	110	9800	8800	85	1.6	1.2	10	1.4	< 1.0	--
cis-1,3-Dichloropropene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Dibromochloromethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Dibromomethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Dichlorodifluoromethane	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Ethyl methacrylate	ug/L		< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 1.0	< 1.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Ethylbenzene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Hexachloro-1,3-butadiene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iodomethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Isobutyl alcohol	ug/L		< 110	< 110	< 110	< 110	< 110	< 110	< 110	< 40	< 40	< 110	< 110	< 110	< 110	< 110	< 40	--	--	< 40	< 40	< 40	< 800	< 400	< 40	< 40	< 40	< 40	< 40	--
Isopropylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 5.0	< 5.0	< 10	< 10	< 10	< 10	< 10	< 5.0	--	--	< 5.0	< 5.0	< 5.0	< 100	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--
Methyl methacrylate	ug/L		< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 1.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Methyl tert-butyl ether	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	409,030	1.0	0.92	1.6	1.7	1.6	0.92	0.69	< 1.0	< 1.0	1.0	0.78	0.69	< 2.0	0.58	< 1.0	--	--	< 1.0	< 1.0	1.7	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Naphthalene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionitrile	ug/L		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 10	< 10	< 20	< 20	< 20	< 20	< 20	< 10	--	--	< 10	< 10	< 10	< 200	< 100	< 10	< 10	< 10	< 10	< 10	--
sec-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
tert-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	8,360	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	9.2	< 1.0	0.65	< 1.0	130	50	100	190	140	1.0	--	--	810	810	3600	3500	320	< 1.0	1.7	2.0	9.8	< 1.0	--
Toluene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
trans-1,2-Dichloroethene	ug/L	175,000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.66	< 1.0	< 1.0	10	2.7	< 1.0	< 1.0	< 1.0	< 1.0	--	--	2.1	2.2	45	62	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
trans-1,3-Dichloropropene	ug/L		< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 1.0	< 1.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
trans-1,4-Dichloro-2-butene	ug/L		< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0	--	--	< 5.0	< 5.0	< 5.0	< 100	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--
Trichloroethene	ug/L	610	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	65	23	22	< 1.0	110	110	27	37	36	4.4	--	--	**1200**	**1000**	**15000**	**14000**	**970**	0.50	1.3	65	4.3	< 1.0	--
Trichlorofluoromethane	ug/L		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	--	--	< 1.0	< 1.0	< 1.0	< 20	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Vinyl Acetate	ug/L		< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0	--	--	< 5.0	< 5.0	< 5.0	< 100	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--
Vinyl chloride	ug/L	4,680	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.0	0.94	< 1.0	32	7.9	< 1.0	< 1.0	< 1.0	< 1.0	--	--	9.2	7.8	14	< 20	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--
Xylenes, total	ug/L		< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	--	--	< 2.0	< 2.0	< 2.0	< 40	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--

Table 4-1 Onsite Groundwater Analytical Result

Chemical Name	Unit	Location ID	MW-28B	MW-31A	MW-31B	MW-31B	MW-32B	MW-33B	MW-33B	MW-34B	MW-38B	MW-39B	MW-6B	MW-6B	MW-7B	MW-8B
		Sample Date	04/22/2012	04/22/2012	01/09/2012	04/22/2012	04/22/2012	01/09/2012	04/22/2012	04/22/2012	01/17/2012	01/17/2012	04/25/2012	04/25/2012	04/24/2012	01/09/2012
		N/FD	N	N	N	N	N	N	N	N	N	N	N	FD	N	N
		Type	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab
		Interim Onsite Cleanup Level														
FIELD																
Dissolved Oxygen, Field	ppm		--	--	0.8	--	--	2.01	--	--	2.44	3.43	--	--	--	0.73
Oxidation-Reduction Potential, Field	mV		--	--	7.1	--	--	51.9	--	--	18.9	47.5	--	--	--	-107
pH, Field	std units		--	--	6.92	--	--	6.91	--	--	7.09	6.97	--	--	--	6.83
Specific Conductivity, Field	us/cm		--	--	1470000	--	--	1668000	--	--	1584000	3040000	--	--	--	1714000
Temperature, Field	deg c		--	--	14.63	--	--	15.67	--	--	13.32	14.38	--	--	--	15.80
INORGANICS																
Alkalinity, Total (as CaCO3)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	mg/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCS																
1,1,1,2-Tetrachloroethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	0.55	0.43	< 10	--
1,1,1-Trichloroethane	ug/L		< 1.0	< 1.0	--	< 1.0	3.1	--	30	3.3	< 1.0	< 1.0	< 1.0	< 1.0	16	--
1,1,2,2-Tetrachloroethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
1,1,2-Trichloroethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
1,1-Dichloroethane	ug/L		< 1.0	< 1.0	--	< 1.0	2.2	--	13	4.3	< 1.0	< 1.0	< 1.0	< 1.0	37	--
1,1-Dichloroethene	ug/L	186,950	< 1.0	< 1.0	--	< 1.0	9.6	--	60	19	< 1.0	0.60	17	15	110	--
1,1-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.5	< 2.5	< 1.0	< 1.0	< 10	--
1,2,4-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 5.0	< 5.0	< 1.0	< 1.0	< 10	--
1,2-Dibromoethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
1,2-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	15,410	< 1.0	< 1.0	--	< 1.0	4.2	--	1.0	1.4	< 1.0	0.57	200	180	< 10	--
1,2-Dichloroethene (total)	ug/L		< 2.0	< 2.0	--	1.5	38	--	36	17	< 1.0	5.4	740	620	64	--
1,2-Dichloropropane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
1,3,5-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L		< 40	< 40	--	< 40	< 40	--	< 40	< 40	< 200	< 200	< 40	< 40	< 400	--
1,4-Dioxane (SIM)	ug/L		--	--	2.7	--	--	2.6	--	--	< 0.20	0.29	--	--	--	0.90
2,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L		< 10	< 10	--	< 10	< 10	--	< 10	< 10	< 6.0	< 6.0	< 10	< 10	< 100	--
2-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L		< 5.0	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 50	--
4-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L		< 5.0	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 50	--
Acetone	ug/L		< 10	< 10	--	< 10	< 10	--	< 10	< 10	< 10	< 10	< 10	< 10	< 100	--
Acetonitrile	ug/L		< 40	< 40	--	< 40	< 40	--	< 40	< 40	< 30	< 30	< 40	< 40	< 400	--
Acrolein	ug/L		< 20	< 20	--	< 20	< 20	--	< 20	< 20	< 20	< 20	< 20	< 20	< 200	--
Acrylonitrile	ug/L		< 5.0	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 20	< 20	< 5.0	< 5.0	< 50	--
Allyl chloride	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 10	--
Benzene	ug/L	13,910	< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Bromobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Bromoform	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Bromomethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 10	--
Carbon Disulfide	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 10	--
Carbon tetrachloride	ug/L	1,710	< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Chlorobenzene	ug/L	366,500	< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Chloroethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 10	--
Chloroform	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	0.78	< 1.0	< 1.0	< 1.0	1.1	1.0	< 10	--
Chloromethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	0.44	< 1.0	< 10	--
Chloroprene	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
cis-1,2-Dichloroethene	ug/L	169,210	< 1.0	< 1.0	--	1.5	38	--	35	17	< 1.0	5.4	740	620	64	--
cis-1,3-Dichloropropene	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Dibromochloromethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Dibromomethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Dichlorodifluoromethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 10	--
Ethyl methacrylate	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 3.0	< 3.0	< 1.0	< 1.0	< 10	--
Ethylbenzene	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Hexachloro-1,3-butadiene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iodomethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
Isobutyl alcohol	ug/L		< 40	< 40	--	< 40	< 40	--	< 40	< 40	< 110	< 110	< 40	< 40	< 400	--
Isopropylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L		< 5.0	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 10	< 10	< 5.0	< 5.0	< 50	--
Methyl methacrylate	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 4.0	< 4.0	< 1.0	< 1.0	< 10	--
Methyl tert-butyl ether	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	409,030	< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	0.33	< 2.0	< 1.0	< 1.0	< 10	--
Naphthalene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionitrile	ug/L		< 10	< 10	--	< 10	< 10	--	< 10	< 10	< 20	< 20	< 10	< 10	< 100	--
sec-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
tert-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	8,360	< 1.0	< 1.0	--	< 1.0	1500	--	2700	640	< 1.0	5.0	**13000**	**12000**	28	--
Toluene	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	--
trans-1,2-Dichloroethene	ug/L	175,000	< 1.0	< 1.0	--	< 1.0	< 1.0	--	1.1	< 1.0	< 1.0	< 1.0	4.7	4.5	< 10	--
trans-1,3-Dichloropropene	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 3.0	< 3.0	< 1.0	< 1.0	< 10	--
trans-1,4-Dichloro-2-butene	ug/L		< 5.0	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 3.0	< 3.0	< 5.0	< 5.0	< 50	--
Trichloroethene	ug/L	610	< 1.0	< 1.0	--	< 1.0	**1100**	--	**1500**	**670**	< 1.0	85	**1800**	**1600**	560	--
Trichlorofluoromethane	ug/L		< 1.0	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 1.0	< 10	--
Vinyl Acetate	ug/L		< 5.0	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 3.0	< 3.0	< 5.0	< 5.0	< 50	--
Vinyl chloride	ug/L	4,680	< 1.0	< 1.0	--	< 1.0	< 1.0	--	1.2	< 1.0	< 1.0	< 1.0	1.2	< 1.0	< 10	--
Xylenes, total	ug/L		< 2.0	< 2.0	--	< 2.0	< 2.0	--	< 2.0	< 2.0	< 1.0	< 1.0	< 2.0	< 2.0	< 20	--

Chemical Name	Unit	MW-8B	PF-20B	PF-21B	PF-22B	PF-23B	PF-23B	PF-24B	PF-25B	PF-25B	PF-26B	PF-27B	PF-28B	PF-29B	PF-30B	PF-31B
		04/23/2012	01/12/2012	01/12/2012	01/12/2012	01/12/2012	01/12/2012	01/12/2012	01/19/2012	01/19/2012	01/19/2012	01/19/2012	01/19/2012	01/19/2012	01/20/2012	01/20/2012
		N	N	N	N	N	FD	N	N	FD	N	N	N	N	N	N
		Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab
FIELD																
Dissolved Oxygen, Field	ppm	--	0.87	1.58	0.82	1.49	--	0.88	2.42	--	3.91	3.32	4.08	2.27	4.35	5.55
Oxidation-Reduction Potential, Field	mV	--	-115.7	-137.5	-187.7	-45.6	--	-89.9	-135	--	0.42	-101	-39	-103	-117	-74
pH, Field	std units	--	6.92	7.08	7.1	6.52	--	6.77	6.77	--	6.48	7.01	6.58	6.61	7.19	7.35
Specific Conductivity, Field	us/cm	--	1695000	1132000	1354000	52980	--	4390000	3950	--	3670	2350	6620	3890	5100	1040
Temperature, Field	deg c	--	11.83	11.58	13.98	11.8	--	14.47	-6.883	--	16.76	14.6	14.39	14.29	17.03	14.59
INORGANICS																
Alkalinity, Total (as CaCO3)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCS																
1,1,1,2-Tetrachloroethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/L	73	< 1.0	< 1.0	5.1	< 1.0	< 1.0	0.30	< 2.0	< 2.0	< 1.0	< 20	< 1.0	0.26	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	ug/L	< 5.0	< 1.0	< 1.0	0.57	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/L	24	< 1.0	< 1.0	3.7	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/L	73	< 1.0	< 1.0	10	< 1.0	< 1.0	5.8	< 2.0	< 2.0	< 1.0	< 20	0.34	1.5	< 1.0	< 1.0
1,1-Dichloropropene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L	< 5.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 5.0	< 5.0	< 2.5	< 50	< 2.5	< 2.5	< 2.5	< 2.5
1,2,4-Trichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	< 10	< 5.0	< 100	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	< 5.0	< 1.0	< 1.0	0.30	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	0.23	< 1.0	< 1.0
1,2-Dichloroethene (total)	ug/L	23	< 1.0	< 1.0	6.8	0.38	0.37	43	3.9	3.9	< 1.0	18	4.2	16	< 1.0	< 1.0
1,2-Dichloropropane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L	< 200	< 200	< 200	< 200	< 200	< 200	< 200	< 400	< 400	< 200	< 4000	< 200	< 200	< 200	< 200
1,4-Dioxane (SIM)	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L	< 50	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 12	< 12	< 6.0	< 120	< 6.0	< 6.0	< 6.0	< 6.0
2-Chlorotoluene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L	< 25	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	< 10	< 5.0	< 100	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L	< 25	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	< 10	< 5.0	< 100	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	ug/L	< 50	< 10	< 10	< 10	< 10	< 10	< 10	< 20	< 20	< 10	< 200	3.8	< 10	< 10	3.0
Acetonitrile	ug/L	< 200	< 30	< 30	< 30	< 30	< 30	< 30	< 60	< 60	< 30	< 600	< 30	< 30	< 30	< 30
Acrolein	ug/L	< 100	< 20	< 20	< 20	< 20	< 20	< 20	< 40	< 40	< 20	< 400	< 20	< 20	< 20	< 20
Acrylonitrile	ug/L	< 25	< 20	< 20	< 20	< 20	< 20	< 20	< 40	< 40	< 20	< 400	< 20	< 20	< 20	< 20
Allyl chloride	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Benzene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	1.3	36	2.6	< 1.0	11	11
Bromoform	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	1.1	< 1.0
Bromomethane	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Carbon tetrachloride	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Chloroform	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	1.3	1.5	46	3.9	0.48	9.1	10
Chloromethane	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Chloroprene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	23	< 1.0	< 1.0	6.8	0.38	0.37	42	3.9	3.9	0.17	18	4.2	16	< 1.0	< 1.0
cis-1,3-Dichloropropene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	0.66	17	1.3	< 1.0	5.0	5.3
Dibromomethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Ethyl methacrylate	ug/L	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 6.0	< 6.0	< 3.0	< 60	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Hexachloro-1,3-butadiene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iodomethane	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
Isobutyl alcohol	ug/L	< 200	< 110	< 110	< 110	< 110	< 110	< 110	< 220	< 220	< 110	< 2200	< 110	< 110	< 110	< 110
Isopropylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L	< 25	< 10	< 10	< 10	< 10	< 10	< 10	< 20	< 20	< 10	< 200	< 10	< 10	< 10	< 10
Methyl methacrylate	ug/L	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0	< 8.0	< 4.0	< 80	< 4.0	< 4.0	< 4.0	< 4.0
Methyl tert-butyl ether	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	0.33	< 4.0	2.0	0.93	< 40	1.1	0.90	0.96	1.3
Naphthalene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionitrile	ug/L	< 50	< 20	< 20	< 20	< 20	< 20	< 20	< 40	< 40	< 20	< 400	< 20	< 20	< 20	< 20
sec-Butylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	ug/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	91	< 1.0	< 1.0	0.46	< 1.0	< 1.0	5.5	560	600	< 1.0	27	21	80	0.41	0.58
Toluene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.25	< 2.0	< 2.0	< 1.0	< 20	< 1.0	0.17	< 1.0	< 1.0
trans-1,3-Dichloropropene	ug/L	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 6.0	< 6.0	< 3.0	< 60	< 3.0	< 3.0	< 3.0	< 3.0
trans-1,4-Dichloro-2-butene	ug/L	< 25	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 6.0	< 6.0	< 3.0	< 60	< 3.0	< 3.0	< 3.0	< 3.0
Trichloroethene	ug/L	290	2.9	4.2	12	7.4	8.1	500	37	39	0.49	310	54	110	1.0	0.54
Trichlorofluoromethane	ug/L	< 5.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0	< 4.0	< 2.0	< 40	< 2.0	< 2.0	< 2.0	< 2.0
Vinyl Acetate	ug/L	< 25	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 6.0	< 6.0	< 3.0	< 60	< 3.0	< 3.0	< 3.0	< 3.0
Vinyl chloride	ug/L	< 5.0	< 1.0	< 1.0	0.87	< 1.0	< 1.0	2.3	< 2.0	< 2.0	< 1.0	< 20	< 1.0	1.8	< 1.0	< 1.0
Xylenes, total	ug/L	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 1.0	< 20	< 1.0	< 1.0	< 1.0	< 2.0

Table 4-1 Onsite Groundwater Analytical Result

		Location ID	PF-9A	PF-9B	SP-12	SP-13	SP-14	SP-15	SP-15	SP-16	SP-16
		Sample Date	04/24/2012	04/24/2012	01/10/2012	01/10/2012	01/10/2012	01/10/2012	01/10/2012	01/10/2012	04/23/2012
		N/FD	N	N	N	N	N	N	FD	N	N
		Type	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab
Chemical Name	**Unit**	**Interim Onsite Cleanup Level**									
FIELD											
Dissolved Oxygen, Field	ppm		--	--	1.21	1.17	1.48	1.26	--	1.61	--
Oxidation-Reduction Potential, Field	mV		--	--	9.3	75.5	-27.9	121.9	--	116.9	--
pH, Field	std units		--	--	6.48	5.8	6.51	6.2	--	6.11	--
Specific Conductivity, Field	us/cm		--	--	2801000	2006000	3014000	4686000	--	5511000	--
Temperature, Field	deg c		--	--	16.42	15.77	15.84	15.37	--	15.1	--
INORGANICS											
Alkalinity, Total (as CaCO3)	mg/L		--	--	--	--	--	--	--	--	--
Calcium	ug/L		--	--	--	--	--	--	--	--	--
Chloride	mg/L		--	--	--	--	--	--	--	--	--
Iron	mg/L		--	--	--	--	--	--	--	--	--
Magnesium	mg/L		--	--	--	--	--	--	--	--	--
Potassium	mg/L		--	--	--	--	--	--	--	--	--
Sodium	mg/L		--	--	--	--	--	--	--	--	--
VOCS											
1,1,1,2-Tetrachloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/L		< 1.0	7.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/L		0.73	14	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/L	186,950	1.2	22	< 1.0	< 1.0	< 1.0	1.6	1.9	< 1.0	< 1.0
1,1-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L		< 1.0	< 1.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 1.0
1,2,4-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L		< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0
1,2-Dibromoethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	15,410	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethene (total)	ug/L		5.1	5.6	< 1.0	< 1.0	0.29	17	22	1.1	< 2.0
1,2-Dichloropropane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L		< 40	< 40	< 200	< 200	< 200	< 200	< 200	< 200	< 40
1,4-Dioxane (SIM)	ug/L		--	--	--	--	--	--	--	2.0	--
2,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L		< 10	< 10	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 10
2-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	ug/L		3.4	< 10	< 10	< 10	< 10	< 10	< 10	2.7	< 10
Acetonitrile	ug/L		< 40	< 40	< 30	< 30	< 30	< 30	< 30	< 30	< 40
Acrolein	ug/L		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acrylonitrile	ug/L		< 5.0	< 5.0	< 20	< 20	< 20	< 20	< 20	< 20	< 5.0
Allyl chloride	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Benzene	ug/L	13,910	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	ug/L		--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L		--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Carbon Disulfide	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Carbon tetrachloride	ug/L	1,710	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/L	366,500	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Chloroform	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Chloroprene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	169,210	5.1	5.6	< 1.0	< 1.0	0.29	17	21	1.1	< 1.0
cis-1,3-Dichloropropene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Ethyl methacrylate	ug/L		< 1.0	< 1.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 1.0
Ethylbenzene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachloro-1,3-butadiene	ug/L		--	--	--	--	--	--	--	--	--
Iodomethane	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isobutyl alcohol	ug/L		< 40	< 40	< 110	< 110	< 110	< 110	< 110	< 110	< 40
Isopropylbenzene	ug/L		--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L		--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L		< 5.0	< 5.0	< 10	< 10	< 10	< 10	< 10	< 10	< 5.0
Methyl methacrylate	ug/L		< 1.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 1.0
Methyl tert-butyl ether	ug/L		--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	409,030	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	0.33	< 1.0
Naphthalene	ug/L		--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L		--	--	--	--	--	--	--	--	--
o-Xylene	ug/L		--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L		--	--	--	--	--	--	--	--	--
Propionitrile	ug/L		< 10	< 10	< 20	< 20	< 20	< 20	< 20	< 20	< 10
sec-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--
Styrene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	8,360	73	160	< 1.0	< 1.0	19	0.24	0.27	< 1.0	< 1.0
Toluene	ug/L		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	ug/L	175,000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.16	< 1.0	< 1.0
trans-1,3-Dichloropropene	ug/L		< 1.0	< 1.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 1.0
trans-1,4-Dichloro-2-butene	ug/L		< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0
Trichloroethene	ug/L	610	46	62	< 1.0	< 1.0	1.5	210	210	14	9.3
Trichlorofluoromethane	ug/L		< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0
Vinyl Acetate	ug/L		< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0
Vinyl chloride	ug/L	4,680	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.42	< 1.0	< 1.0
Xylenes, total	ug/L		< 2.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0

Table 4-2 Offsite Groundwater Analytical Results

Chemical Name	Unit	Location ID Sample Date N/FD Type Offsite Cleanup Level	ADAMS-A 01/12/2012 N Fixed Lab	ADAMS-A 04/23/2012 N Fixed Lab	ADAMS-After Filter 04/23/2012 N Fixed Lab	ADAMS-Between Filter 04/23/2012 N Fixed Lab	AIW-MW-11B 02/24/2012 N Fixed Lab	AIW-MW-13B 02/24/2012 N Fixed Lab	AIW-MW-15B 02/24/2012 N Fixed Lab	AIW-MW-16B 02/24/2012 N Fixed Lab	AIW-MW-17B 02/24/2012 N Fixed Lab	AIW-MW-17B 02/24/2012 FD Fixed Lab	GW-30 10/24/2012 N Fixed Lab	GW-30 10/24/2012 FD Fixed Lab	GW-31 10/24/2012 N Fixed Lab	GW-32 10/24/2012 N Fixed Lab	GW-40 10/24/2012 N Fixed Lab	GW-52 01/08/2013 N Mobile Lab	GW-53 01/08/2013 N Mobile Lab	GW-54 01/08/2013 N Mobile Lab	GW-55 01/08/2013 N Mobile Lab	GW-56 01/09/2013 N Mobile Lab	GW-57 01/09/2013 N Mobile Lab	GW-58 01/09/2013 N Mobile Lab	GW-59 01/09/2013 N Mobile Lab	GW-60 01/09/2013 N Mobile Lab
FIELD																										
Dissolved Oxygen, Field	ppm		--	--	--	--	6.32	2.19	2.51	0.93	5.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oxidation-Reduction Potential, Field	mV		--	--	--	--	-1092	-128.2	-102.6	-124.3	-100.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
pH, Field	std units		--	--	--	--	6.82	6.79	7.27	7.13	6.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Specific Conductivity, Field	us/cm		--	--	--	--	3153000	3553000	1136000	2127000	3542000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Temperature, Field	deg c		--	--	--	--	15.58	15.41	14.89	14.71	15.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCS																										
1,1,1,2-Tetrachloroethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	ug/L	200	--	< 1.0	< 1.0	< 1.0	0.28	0.82	< 1.0	< 1.0	1.6	1.1	15.2	13.8	24.2	21.8	22.2	10	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	7.3	2.8	3.3
1,1,2,2-Tetrachloroethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	ug/L	5	--	< 1.0	< 1.0	< 1.0	< 1.0	0.34	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	ug/L		--	0.77	< 1.0	< 1.0	0.51	0.60	< 1.0	< 1.0	6.7	5.6	6.9	6.6	9.4	7.8	6.4	3.6	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.1	< 0.50	0.80
1,1-Dichloroethene	ug/L	7	--	< 1.0	< 1.0	< 1.0	0.95	1.0	< 1.0	< 1.0	**9.3**	5.9	**26**	**23.2**	**47.8**	**45.3**	**41.3**	**15**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**9.8**	2.3	3.6
1,1-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L	0.2	--	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,2-Dibromoethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	5	--	0.68	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.16	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethene (total)	ug/L		--	1.7	< 2.0	< 2.0	0.95	2.6	< 1.0	< 1.0	2.6	2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	ug/L	5	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L	600	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L	75	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L		--	< 40	< 40	< 40	< 200	< 200	< 200	< 200	< 200	< 200	0.57	0.63	0.89	0.64	0.77	--	--	--	--	--	--	--	--	--
1,4-Dioxane (SIM)	ug/L		0.35	--	--	--	--	--	--	< 0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L		--	< 10	< 10	< 10	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L		--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L		--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Acetone	ug/L		--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Acetonitrile	ug/L		--	< 40	< 40	< 40	< 30	< 30	< 30	< 30	< 30	< 30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acrolein	ug/L		--	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acrylonitrile	ug/L		--	< 5.0	< 5.0	< 5.0	< 20	< 20	< 20	< 20	< 20	< 20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Allyl chloride	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	ug/L	5	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--
Bromobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Bromoform	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Bromomethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
Carbon Disulfide	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	2.5	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	ug/L	5	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Chlorobenzene	ug/L	100	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Chloroethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
Chloroform	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	0.26	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Chloromethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
Chloroprene	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	ug/L	70	--	1.7	< 1.0	< 1.0	0.95	2.6	< 1.0	< 1.0	2.6	2.0	5.2	4.8	7.2	8.1	6.1	1.7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.9	0.78	1.2
cis-1,3-Dichloropropene	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--
Dibromochloromethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Dibromomethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Dichlorodifluoromethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
Ethyl methacrylate	ug/L		--	< 1.0	< 1.0	< 1.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	--	< 1.0	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	ug/L	700	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Hexachloro-1,3-butadiene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Iodomethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Isobutyl alcohol	ug/L		--	< 40	< 40	< 40	< 110	< 110	< 110	< 110	< 110	< 110	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopropylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L		--	< 5.0	< 5.0	< 5.0	< 10	< 10	< 10	< 10	< 10	< 10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl methacrylate	ug/L		--	< 1.0	< 1.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl tert-butyl ether	ug/L		--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	5	--	< 1.0	< 1.0	< 1.0	< 2.0	0.41	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	--	--	--	--	--	--	--	--	--
Naphthalene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
o-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Propionitrile	ug/L		--	< 10	< 10	< 10	< 20	< 20	< 20	< 20	< 20	< 20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
sec-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Styrene	ug/L	100	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
tert-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	5	--	< 1.0	< 1.0	< 1.0	**32**	**280**	0.42	< 1.0	0.26	< 1.0	**77.3**	**54.5**	**127**	**42.1**	**37.9**	**8.1**	**15**	< 0.50	< 0.50	< 0.50	< 0.50	**36**	**9.7**	2.8
Toluene	ug/L	1000	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	ug/L	100	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	ug/L		--	< 1.0	< 1.0	< 1.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--
trans-1,4-Dichloro-2-butene	ug/L		--	< 5.0	< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	ug/L	5	--	< 1.0	< 1.0	< 1.0	2.5	**13**	< 1.0	< 1.0	**9.2**	4.7	**312**	**270**	**1060**	**675**	**417**	**140**	4.3	< 0.50	< 0.50	< 0.50	**6.8**	**190**	**43**	**47**
Trichlorofluoromethane	ug/L		--	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--
Vinyl Acetate	ug/L		--	< 5.0	< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	--	--	--	--	--	--	--	--	--
Vinyl chloride	ug/L	2	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Xylenes, total	ug/L	10000	--	< 2.0	< 2.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	--	--	--	--	--	--	--	--	--

Table 4-2 Offsite Groundwater Analytical Results

		Location ID	GW-61	GW-62	GW-63	GW-63	GW-64	GW-69	GW-70	GW-70	GW-71	GW-72	GW-72	MW-29A	MW-29B	MW-29BR	MW-30A	MW-30B	MW-30B	MW-36B	MW-36B	MW-37B	MW-37B	PF-13B	PF-13B	PF-14B	PF-14B	PF-32B	PF-33B
		Sample Date	01/09/2013	01/09/2013	01/09/2013	01/09/2013	01/10/2013	01/10/2013	01/10/2013	01/10/2013	01/10/2013	01/10/2013	01/10/2013	04/22/2012	04/22/2012	01/09/2012	04/23/2012	01/13/2012	04/23/2012	01/10/2012	04/23/2012	01/10/2012	04/23/2012	01/13/2012	04/24/2012	01/13/2012	04/24/2012	02/08/2012	02/08/2012
		N/FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
		Type	Mobile Lab	Mobile Lab	Fixed Lab	Mobile Lab	Mobile Lab	Mobile Lab	Fixed Lab	Mobile Lab	Mobile Lab	Fixed Lab	Mobile Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab	Fixed Lab
Chemical Name	Unit	Offsite Cleanup Level																											
FIELD																													
Dissolved Oxygen, Field	ppm		--	--	--	--	--	--	--	--	--	--	--	--	--	1.05	--	3	--	0.99	--	1.72	--	2.06	--	2.7	--	--	--
Oxidation-Reduction Potential, Field	mV		--	--	--	--	--	--	--	--	--	--	--	--	--	-69.8	--	-3.6	--	111	--	103.5	--	-25.1	--	-81.6	--	51.7	48.6
pH, Field	std units		--	--	--	--	--	--	--	--	--	--	--	--	--	6.74	--	7.31	--	6.41	--	6.53	--	6.06	--	6.88	--	7.76	7.49
Specific Conductivity, Field	us/cm		--	--	--	--	--	--	--	--	--	--	--	--	--	2094000	--	919000	--	4094000	--	3615000	--	3437000	--	2413000	--	1823	5427
Temperature, Field	deg c		--	--	--	--	--	--	--	--	--	--	--	--	--	16.38	--	16.95	--	15.57	--	12.37	--	14.18	--	11.81	--	13.45	13.43
VOCS																													
1,1,1,2-Tetrachloroethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/L	200	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	0.34	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.21
1,1,2,2-Tetrachloroethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	ug/L	5	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/L		< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	1.5	1.9	--	< 1.0	< 1.0	< 1.0	0.37	< 1.0	< 1.0	< 1.0	1.6	1.4	< 1.0	< 1.0	< 1.0	0.24
1,1-Dichloroethene	ug/L	7	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	1.2	1.8	--	< 1.0	< 1.0	< 1.0	2.3	1.6	< 1.0	< 1.0	1.9	1.8	0.43	< 1.0	< 1.0	1.3
1,1-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3-Trichloropropane	ug/L		--	--	< 2.5	--	--	--	< 2.5	--	--	< 2.5	--	< 1.0	< 1.0	--	< 1.0	< 2.5	< 1.0	< 2.5	< 1.0	< 2.5	< 1.0	< 2.5	< 1.0	< 2.5	< 1.0	< 2.5	< 2.5
1,2,4-Trichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dibromo-3-chloropropane	ug/L	0.2	--	--	< 5.0	--	--	--	< 5.0	--	--	< 5.0	--	< 1.0	< 1.0	--	< 1.0	< 5.0	< 1.0	< 5.0	< 1.0	< 5.0	< 1.0	< 5.0	< 1.0	< 5.0	< 1.0	< 5.0	< 5.0
1,2-Dibromoethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	ug/L	5	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	1.4	1.7	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.15	< 1.0	< 1.0	< 1.0	< 1.0	0.14
1,2-Dichloroethene (total)	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	8.8	12	--	< 2.0	< 1.0	< 2.0	16	13	< 1.0	< 2.0	3.1	3.3	89	34	< 1.0	13
1,2-Dichloropropane	ug/L	5	--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichlorobenzene	ug/L	600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	ug/L	75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dioxane	ug/L		--	--	< 200	--	--	--	< 200	--	--	< 200	--	< 40	< 40	--	< 40	< 200	< 40	< 200	< 40	< 200	< 40	< 200	< 40	< 200	< 40	< 200	< 200
1,4-Dioxane (SIM)	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	3.4	--	< 0.20	--	1.0	--	--	--	--	--	--	--	--	--
2,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone (MEK)	ug/L		--	--	< 6.0	--	--	--	< 6.0	--	--	< 6.0	--	< 10	< 10	--	< 10	< 6.0	< 10	< 6.0	< 10	< 6.0	< 10	< 6.0	< 10	< 6.0	< 10	< 6.0	< 6.0
2-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	ug/L		--	--	< 5.0	--	--	--	< 5.0	--	--	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-pentanone (MIBK)	ug/L		--	--	< 5.0	--	--	--	< 5.0	--	--	< 5.0	--	< 5.0	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	ug/L		--	--	4.1	--	--	--	< 10	--	--	2.6	--	< 10	< 10	--	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	4.3	< 10
Acetonitrile	ug/L		--	--	< 30	--	--	--	< 30	--	--	< 30	--	< 40	< 40	--	< 40	< 30	< 40	< 30	< 40	< 30	< 40	< 30	< 40	< 30	< 40	< 30	< 30
Acrolein	ug/L		--	--	< 20	--	--	--	< 20	--	--	< 20	--	< 20	< 20	--	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Acrylonitrile	ug/L		--	--	< 20	--	--	--	< 20	--	--	< 20	--	< 5.0	< 5.0	--	< 5.0	< 20	< 5.0	< 20	< 5.0	< 20	< 5.0	< 20	< 5.0	< 20	< 5.0	< 20	< 20
Allyl chloride	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0
Benzene	ug/L	5	--	--	0.35	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromochloromethane	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	9.9	< 1.0
Bromoform	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0
Bromomethane	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0
Carbon Disulfide	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0
Carbon tetrachloride	ug/L	5	--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/L	100	--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0
Chloroform	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	6.4	< 2.0
Chloroprene	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/L	70	< 0.50	< 0.50	0.18	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	8.8	12	--	< 1.0	< 1.0	< 1.0	16	13	< 1.0	< 1.0	3.1	3.3	**88**	34	< 1.0	13
cis-1,3-Dichloropropene	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.3	< 1.0
Dibromomethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0
Ethyl methacrylate	ug/L		--	--	< 3.0	--	--	--	< 3.0	--	--	< 3.0	--	< 1.0	< 1.0	--	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 3.0
Ethylbenzene	ug/L	700	--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachloro-1,3-butadiene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iodomethane	ug/L		--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isobutyl alcohol	ug/L		--	--	< 110	--	--	--	< 110	--	--	< 110	--	< 40	< 40	--	< 40	< 110	< 40	< 110	< 40	< 110	< 40	< 110	< 40	< 110	< 40	< 110	< 110
Isopropylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
m,p-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methacrylonitrile	ug/L		--	--	< 10	--	--	--	< 10	--	--	< 10	--	< 5.0	< 5.0	--	< 5.0	< 10	< 5.0	< 10	< 5.0	< 10	< 5.0	< 10	< 5.0	< 10	< 5.0	< 10	< 10
Methyl methacrylate	ug/L		--	--	< 4.0	--	--	--	< 4.0	--	--	< 4.0	--	< 1.0	< 1.0	--	< 1.0	< 4.0	< 1.0	< 4.0	< 1.0	< 4.0	< 1.0	< 4.0	< 1.0	< 4.0	< 1.0	< 4.0	< 4.0
Methyl tert-butyl ether	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	ug/L	5	--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	0.54	0.37
Naphthalene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Propylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
o-Xylene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p-Isopropyltoluene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Propionitrile	ug/L		--	--	< 20	--	--	--	< 20	--	--	< 20	--	< 10	< 10	--	< 10	< 20	< 10	< 20	< 10	< 20	< 10	< 20	< 10	< 20	< 10	< 20	< 20
sec-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	ug/L	100	--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	ug/L		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	ug/L	5	< 0.50	< 0.50	1.8	2.6	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	**97**	**71**	< 1.0	< 1.0	3.2	3.3	**100**	**140**	< 1.0	**57**
Toluene	ug/L	1000	--	--	0.71	--	--	--	< 1.0	--	--	< 1.0	--	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	ug/L	100	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	0.21	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.45	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	ug/L		--	--	< 3.0	--	--	--	< 3.0	--	--	< 3.0	--	< 1.0	< 1.0	--	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 1.0	< 3.0	< 3.0
trans-1,4-Dichloro-2-butene	ug/L		--	--	< 3.0	--	--	--	< 3.0	--	--	< 3.0	--	< 5.0	< 5.0	--	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 3.0
Trichloroethene	ug/L	5	< 0.50	< 0.50	2.6	3.0	< 0.50	< 0.50	0.18	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	**180**	**130**	< 1.0	< 1.0	**38**	**33**	4.5	4.0	< 1.0	**130**
Trichlorofluoromethane	ug/L		--	--	< 2.0	--	--	--	< 2.0	--	--	< 2.0	--	< 1.0	< 1.0	--	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 2.0
Vinyl Acetate	ug/L		--	--	< 3.0	--	--	--	< 3.0	--	--	< 3.0	--	< 5.0	< 5.0	--	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 5.0	< 3.0	< 3.0
Vinyl chloride	ug/L	2	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	--	< 1.0	< 1.0	< 1.0	0.96	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.71
Xylenes, total	ug/L	10000	--	--	< 1.0	--	--	--	< 1.0	--	--	< 1.0	--	< 2.0	< 2.0	--	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 2.0	< 1.0	< 1.0

Table 4-2 Offsite Groundwater Analytical Results

Chemical Name	Unit	Location ID Sample Date N/FD Type Offsite Cleanup Level	PF-6B 01/13/2012 N Fixed Lab
FIELD			
Dissolved Oxygen, Field	ppm		1.49
Oxidation-Reduction Potential, Field	mV		55.7
pH, Field	std units		6.85
Specific Conductivity, Field	us/cm		1574000
Temperature, Field	deg c		13.86
VOCS			
1,1,1,2-Tetrachloroethane	ug/L		< 1.0
1,1,1-Trichloroethane	ug/L	200	< 1.0
1,1,2,2-Tetrachloroethane	ug/L		< 1.0
1,1,2-Trichloroethane	ug/L	5	< 1.0
1,1-Dichloroethane	ug/L		< 1.0
1,1-Dichloroethene	ug/L	7	< 1.0
1,1-Dichloropropene	ug/L		--
1,2,3-Trichlorobenzene	ug/L		--
1,2,3-Trichloropropane	ug/L		< 2.5
1,2,4-Trichlorobenzene	ug/L		--
1,2,4-Trimethylbenzene	ug/L		--
1,2-Dibromo-3-chloropropane	ug/L	0.2	< 5.0
1,2-Dibromoethane	ug/L		< 1.0
1,2-Dichlorobenzene	ug/L		--
1,2-Dichloroethane	ug/L	5	< 1.0
1,2-Dichloroethene (total)	ug/L		< 1.0
1,2-Dichloropropane	ug/L	5	< 1.0
1,3,5-Trimethylbenzene	ug/L		--
1,3-Dichlorobenzene	ug/L	600	--
1,3-Dichloropropane	ug/L		--
1,4-Dichlorobenzene	ug/L	75	--
1,4-Dioxane	ug/L		< 200
1,4-Dioxane (SIM)	ug/L		--
2,2-Dichloropropane	ug/L		--
2-Butanone (MEK)	ug/L		< 6.0
2-Chlorotoluene	ug/L		--
2-Hexanone	ug/L		< 5.0
4-Chlorotoluene	ug/L		--
4-Methyl-2-pentanone (MIBK)	ug/L		< 5.0
Acetone	ug/L		< 10
Acetonitrile	ug/L		< 30
Acrolein	ug/L		< 20
Acrylonitrile	ug/L		< 20
Allyl chloride	ug/L		< 2.0
Benzene	ug/L	5	< 1.0
Bromobenzene	ug/L		--
Bromochloromethane	ug/L		--
Bromodichloromethane	ug/L		< 1.0
Bromoform	ug/L		< 1.0
Bromomethane	ug/L		< 2.0
Carbon Disulfide	ug/L		< 2.0
Carbon tetrachloride	ug/L	5	< 1.0
Chlorobenzene	ug/L	100	< 1.0
Chloroethane	ug/L		< 2.0
Chloroform	ug/L		< 1.0
Chloromethane	ug/L		< 2.0
Chloroprene	ug/L		< 1.0
cis-1,2-Dichloroethene	ug/L	70	< 1.0
cis-1,3-Dichloropropene	ug/L		< 1.0
Dibromochloromethane	ug/L		< 1.0
Dibromomethane	ug/L		< 1.0
Dichlorodifluoromethane	ug/L		< 2.0
Ethyl methacrylate	ug/L		< 3.0
Ethylbenzene	ug/L	700	< 1.0
Hexachloro-1,3-butadiene	ug/L		--
Iodomethane	ug/L		< 1.0
Isobutyl alcohol	ug/L		< 110
Isopropylbenzene	ug/L		--
m,p-Xylene	ug/L		--
Methacrylonitrile	ug/L		< 10
Methyl methacrylate	ug/L		< 4.0
Methyl tert-butyl ether	ug/L		--
Methylene chloride	ug/L	5	< 2.0
Naphthalene	ug/L		--
n-Butylbenzene	ug/L		--
n-Propylbenzene	ug/L		--
o-Xylene	ug/L		--
p-Isopropyltoluene	ug/L		--
Propionitrile	ug/L		< 20
sec-Butylbenzene	ug/L		--
Styrene	ug/L	100	< 1.0
tert-Butylbenzene	ug/L		--
Tetrachloroethene	ug/L	5	< 1.0
Toluene	ug/L	1000	< 1.0
trans-1,2-Dichloroethene	ug/L	100	< 1.0
trans-1,3-Dichloropropene	ug/L		< 3.0
trans-1,4-Dichloro-2-butene	ug/L		< 3.0
Trichloroethene	ug/L	5	< 1.0
Trichlorofluoromethane	ug/L		< 2.0
Vinyl Acetate	ug/L		< 3.0
Vinyl chloride	ug/L	2	< 1.0
Xylenes, total	ug/L	10000	< 1.0

Table 4-3 Surface Water Analytical Results

Chemical Name	Unit	Location ID / Sample Date / N/FD / Type / KS Surface Water Quality Standard	SW-01 01/07/2013 N Mobile Lab	SW-02 01/07/2013 N Mobile Lab	SW-03 01/07/2013 N Mobile Lab	SW-04 01/07/2013 N Mobile Lab	SW-05 01/08/2013 N Mobile Lab	SW-06 01/09/2013 N Mobile Lab	SW-07 01/09/2013 N Mobile Lab	SW-08 01/10/2013 N Mobile Lab	SW-09 01/10/2013 N Fixed Lab	SW-09 01/10/2013 N Mobile Lab
VOCS												
1,1,1,2-Tetrachloroethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,1,1-Trichloroethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,1,1-Trichloroethane	ug/L	200	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
1,1,2,2-Tetrachloroethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,1,2-Trichloroethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,1,2-Trichloroethane	ug/L	16	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
1,1-Dichloroethane	ug/L		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50
1,1-Dichloroethene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,1-Dichloroethene	ug/L	0.057	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
1,2,3-Trichloropropane	ug/L		--	--	--	--	--	--	--	--	< 2.5	--
1,2-Dibromo-3-chloropropane	ug/L		--	--	--	--	--	--	--	--	< 5.0	--
1,2-Dibromoethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,2-Dichloroethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,2-Dichloroethane	ug/L	0.38	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
1,2-Dichloroethene (total)	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,2-Dichloropropane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
1,4-Dioxane	ug/L		--	--	--	--	--	--	--	--	< 200	--
2-Butanone (MEK)	ug/L		--	--	--	--	--	--	--	--	< 6.0	--
2-Hexanone	ug/L		--	--	--	--	--	--	--	--	< 5.0	--
4-Methyl-2-pentanone (MIBK)	ug/L		--	--	--	--	--	--	--	--	< 5.0	--
Acetone	ug/L		--	--	--	--	--	--	--	--	< 10	--
Acetonitrile	ug/L		--	--	--	--	--	--	--	--	< 30	--
Acrolein	ug/L		--	--	--	--	--	--	--	--	< 20	--
Acrylonitrile	ug/L		--	--	--	--	--	--	--	--	< 20	--
Allyl chloride	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Benzene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Bromodichloromethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Bromoform	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Bromomethane	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Carbon Disulfide	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Carbon tetrachloride	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Chlorobenzene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Chloroethane	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Chloroform	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Chloromethane	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Chloroprene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
cis-1,2-Dichloroethene	ug/L		--	--	--	--	--	--	--	--	0.21	--
cis-1,2-Dichloroethene	ug/L	70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
cis-1,3-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Dibromochloromethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Dibromomethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Dichlorodifluoromethane	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Ethyl methacrylate	ug/L		--	--	--	--	--	--	--	--	< 3.0	--
Ethylbenzene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Iodomethane	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Isobutyl alcohol	ug/L		--	--	--	--	--	--	--	--	< 110	--
Methacrylonitrile	ug/L		--	--	--	--	--	--	--	--	< 10	--
Methyl methacrylate	ug/L		--	--	--	--	--	--	--	--	< 4.0	--
Methylene chloride	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Propionitrile	ug/L		--	--	--	--	--	--	--	--	< 20	--
Styrene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Tetrachloroethene	ug/L		--	--	--	--	--	--	--	--	0.25	--
Tetrachloroethene	ug/L	0.8	< 0.50	< 0.50	< 0.50	< 0.50	0.58	< 0.50	< 0.50	< 0.50	--	< 0.50
Toluene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
trans-1,2-Dichloroethene	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
trans-1,2-Dichloroethene	ug/L	100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
trans-1,3-Dichloropropene	ug/L		--	--	--	--	--	--	--	--	< 3.0	--
trans-1,4-Dichloro-2-butene	ug/L		--	--	--	--	--	--	--	--	< 3.0	--
Trichloroethene	ug/L		--	--	--	--	--	--	--	--	2.1	--
Trichloroethene	ug/L	2.7	< 0.50	< 0.50	< 0.50	< 0.50	**3.7**	< 0.50	< 0.50	1.2	--	1.8
Trichlorofluoromethane	ug/L		--	--	--	--	--	--	--	--	< 2.0	--
Vinyl Acetate	ug/L		--	--	--	--	--	--	--	--	< 3.0	--
Vinyl chloride	ug/L		--	--	--	--	--	--	--	--	< 1.0	--
Vinyl chloride	ug/L	2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
Xylenes, total	ug/L		--	--	--	--	--	--	--	--	< 1.0	--

Table 4-4 Annual Monitoring PRB ORP and pH Data

Phase I Gate		**GW-1** Upgradient Gravel	**GW-2** Upgradient Gravel	**GW-3** Upgradient Gravel	**IW-1** 100% ZVI	**GW-4** Downgradient Gravel	**GW-5** Downgradient Gravel	**GW-6** Downgradient Gravel
ORP	2007	-274	-257	-246	-356	-269	-330	-286
	2008	-192	-213	-242	-239	-97	-274	-273
	2009	NM	-143	NM	-263	NM	-266	NM
	2011	NM	-116	NM	-83	NM	-140	NM
	2012	NM	-72	NM	120	NM	-52	NM
pH	2008	8.47	7.78	8.96	10.67	9.6	10.20	10.19
	2009	NM	8.28	NM	10.91	NM	10.66	NM
	2010	NM	7.78	NM	11.04	NM	10.41	NM
	2011	NM	7.46	NM	11.14	NM	10.79	NM
	2012	NM	6.42	NM	10.33	NM	9.03	NM
Phase II Gate 1		IW1-1 Upgradient ZVI/sand	IW1-2 Upgradient ZVI/sand	IW1-3 Upgradient ZVI/sand	IW1-4 Downgradient ZVI/sand	IW1-5 Downgradient ZVI/sand	IW1-6 Downgradient ZVI/sand	
ORP	2008	-135	-132	-118	-396	-417	-292	
	2009	NM	-142	NM	NM	-377	NM	
	2010	NM	-96.8	NM	NM	-359	NM	
	2011	NM	-214	NM	NM	-254	NM	
	2012	NM	-42	NM	NM	-356	NM	
pH	2008	6.93	9.52	10.09	10.57	10.55	8.95	
	2009	NM	10.06	NM	NM	10.62	NM	
	2010	NM	10.19	NM	NM	10.35	NM	
	2011	NM	9.89	NM	NM	10.56	NM	
	2012	NM	7.32	NM	NM	9.96	NM	
Phase II Gate 2		**IW2-2** Upgradient ZVI/sand	**IW2-3** Upgradient ZVI/sand	**IW2-4** Upgradient ZVI/sand	**IW2-7** Middle ZVI/sand	**IW2-9** Downgradient ZVI/sand	**IW2-10** Downgradient ZVI/sand	**IW2-11** Downgradient ZVI/sand
ORP	2008	-311	-286	-215	-331	NM	-177	-379
	2009	NM	-332	NM	NM	NM	-164	NM
	2010	NM	270	NM	-489	NM	-113	NM
	2011	NM	-192	NM	NM	NM	-116	NM
	2012	NM	NM	NM	-281	NM	-91	NM
pH	2008	10.40	9.71	10.20	10.92	NM	6.77	10.53
	2009	NM	9.81	NM	NM	NM	6.73	NM
	2010	NM	8.05	NM	9.95	NM	6.02	NM
	2011	NM	10.02	NM	NM	NM	6.69	NM
	2012	NM	NM	NM	9.85	NM	6.85	NM

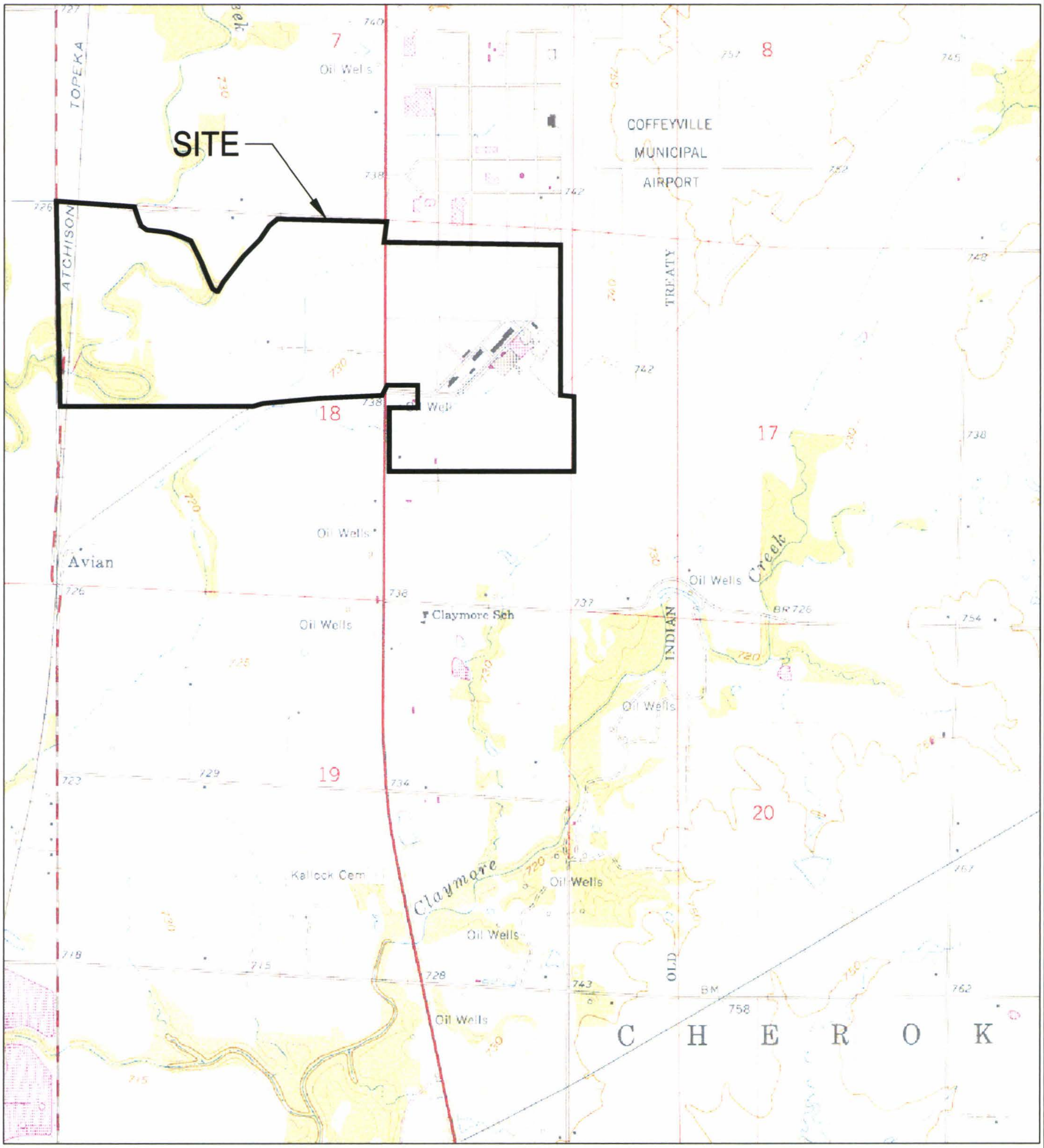
NM = not measured.

Table 4-5 Adams Carbon System VOC Concentrations

VOC	MCL (µg/L)	Adams-A Well (µg/L)	Between Canisters (µg/L)	After Canisters (µg/L)
cDCE	70	1.7	ND (<2)	ND (<2)
1,1-DCA	None	0.77	ND (<1)	ND (<1)
1,2-DCA	5	0.68	ND (<1)	ND (<1)
PCE	5	ND (<1)	ND (<1)	ND (<1)
TCE	5	ND (<1)	ND (<1)	ND (<1)
Toluene	1,000	ND (<1)	ND (<1)	ND (<1)
Acetone	None	ND (<10)	ND (<10)	ND (<10)
2-Butanone (MEK)	None	ND (<10)	ND (<10)	ND (<10)

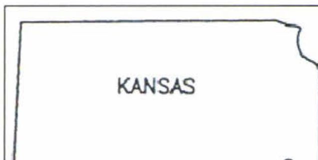
cDCE = cis 1,2-dichloroethene.

Figures



1000 0 2000

Scale in Feet



QUADRANGLE LOCATION

U.S.G.S. 7.5 MINUTE SERIES (TOPOGRAPHIC)

COFFEYVILLE EAST QUADRANGLE
KANSAS

AECOM

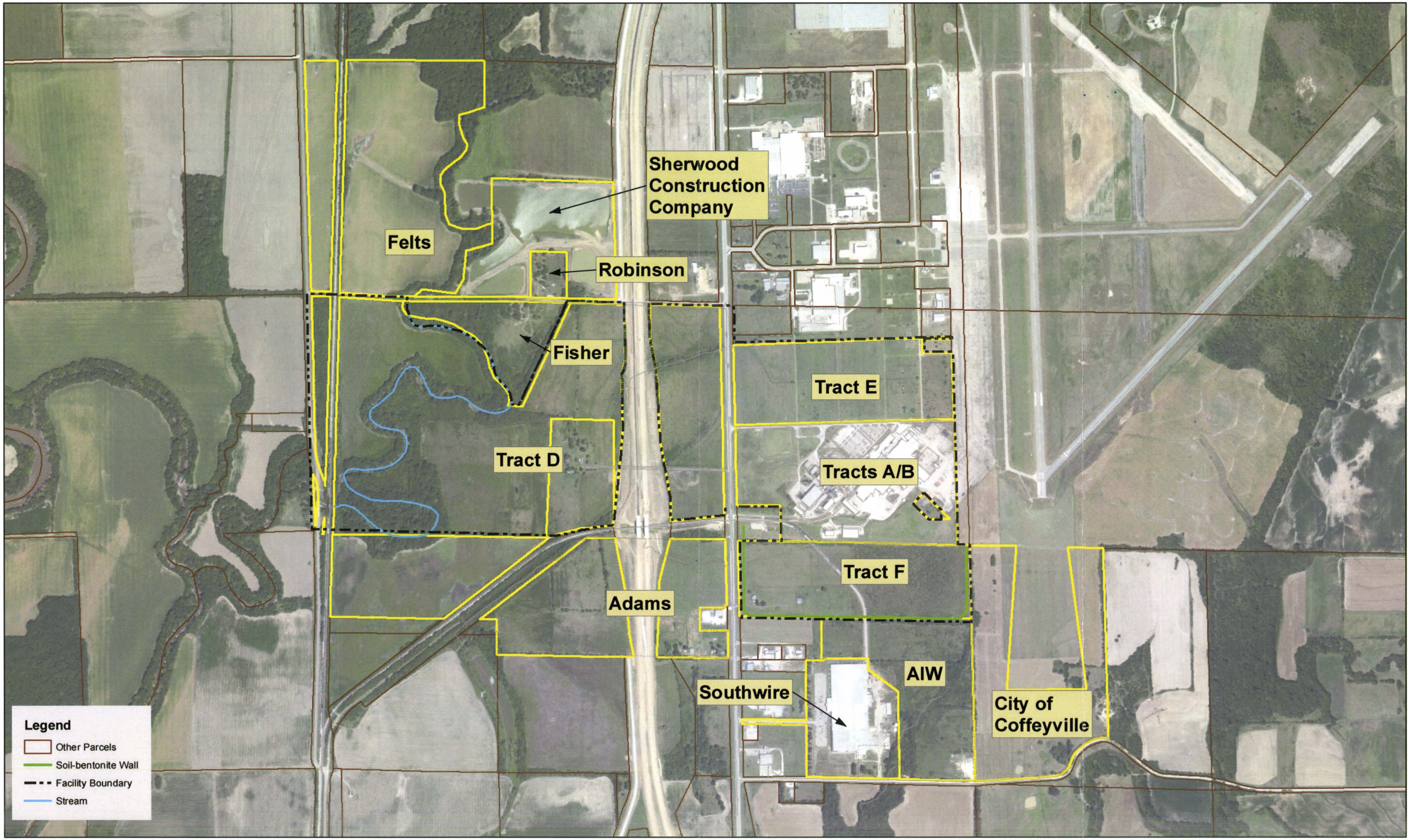
CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS

60136561.100

DATE: 03/05/10 DRWN: LP/FTC

FACILITY LOCATION MAP

FIGURE 2-1



Notes:
1. See Location Detail for Gate wells
2. Imagery: Esri Online
3. Parcels: Montgomery County GIS Department, 2013

0 250 500 1,000 1,500 Feet
1 inch = 1,000 feet

AECOM

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

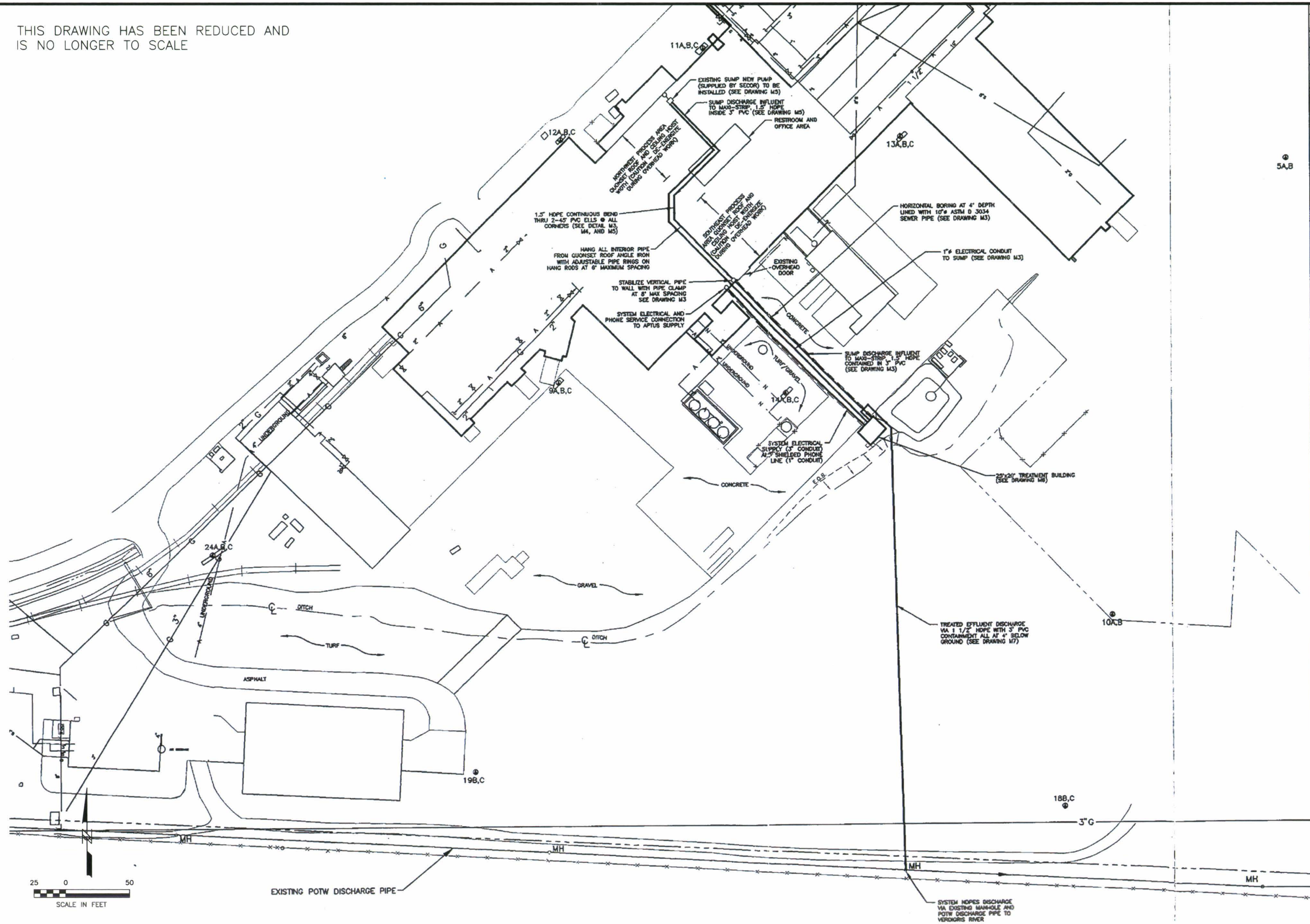
Facility Property Boundaries

DATE: 03/08/2013 | DRWN: RB/ftc | Revision:

FIGURE 2-2

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\PropertyBoundaries.mxd

THIS DRAWING HAS BEEN REDUCED AND
IS NO LONGER TO SCALE



AECOM

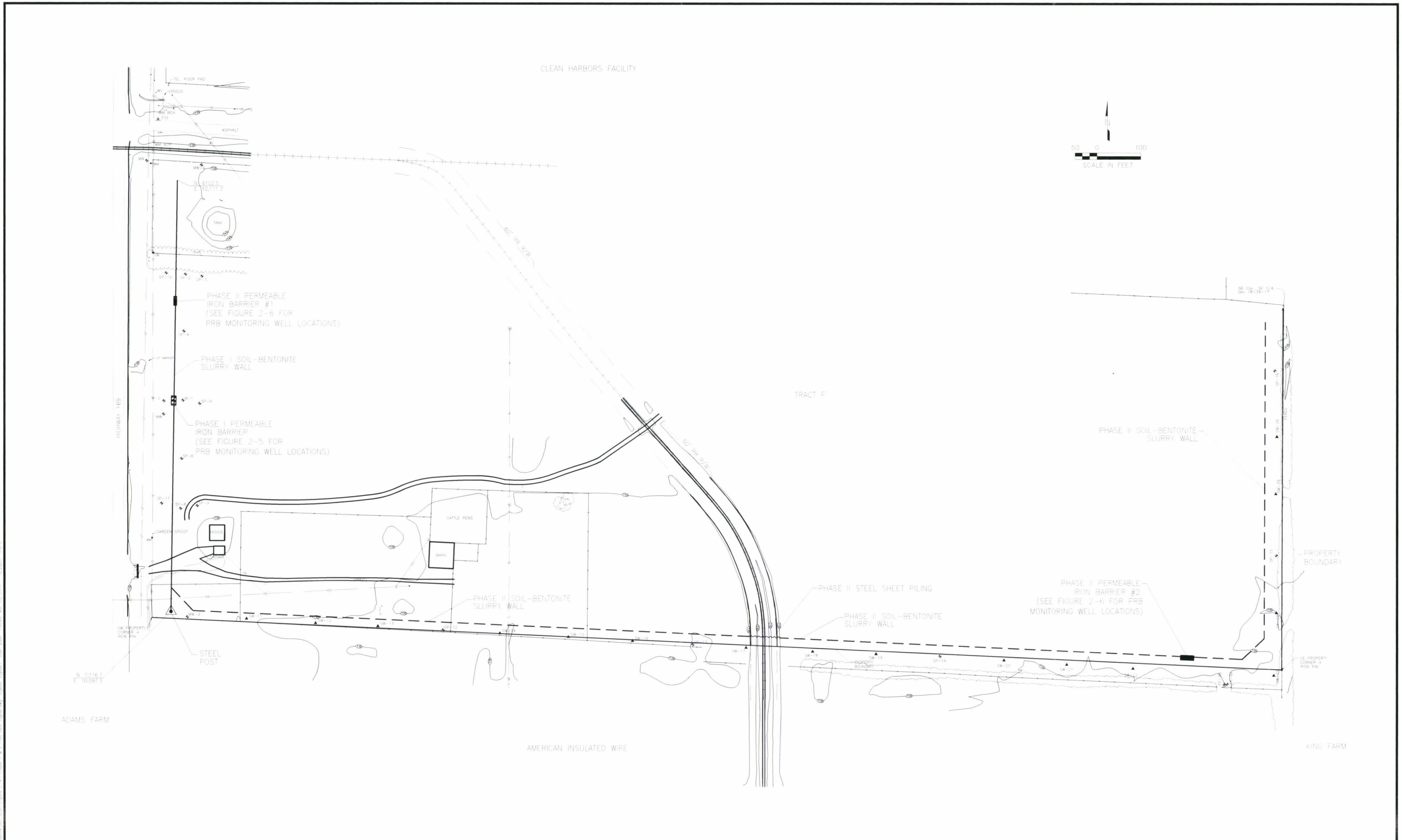
CLEAN HARBORS
COFFEYVILLE, KANSAS

PUMP AND TREAT SYSTEM LAYOUT

DATE: 03/05/10 | DRWN: LP/FTC

FIGURE 2-3

File: J:\ACADP\Clean Harbors\Coffeyville\60136561\Figure 2-3 Pump and Treatment Layout.dwg Layout: Layout1 User: paull Plotted: Mar 05, 2010 - 12:21pm Xref's:



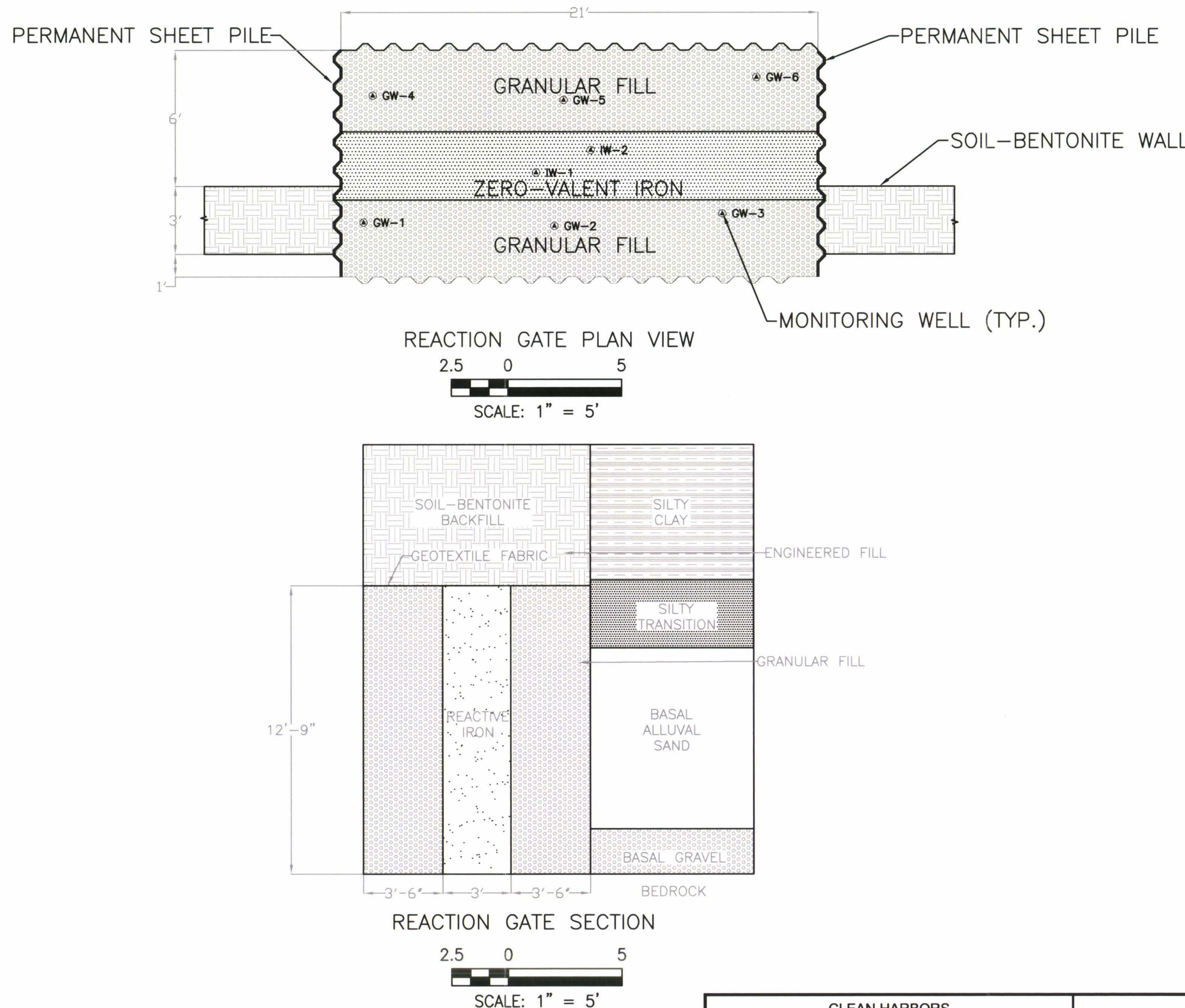
AECOM

CLEAN HARBORS
COFFEYVILLE, KANSAS

PHASE I AND II
PRB FUNNEL-AND-GATE SYSTEM LAYOUT

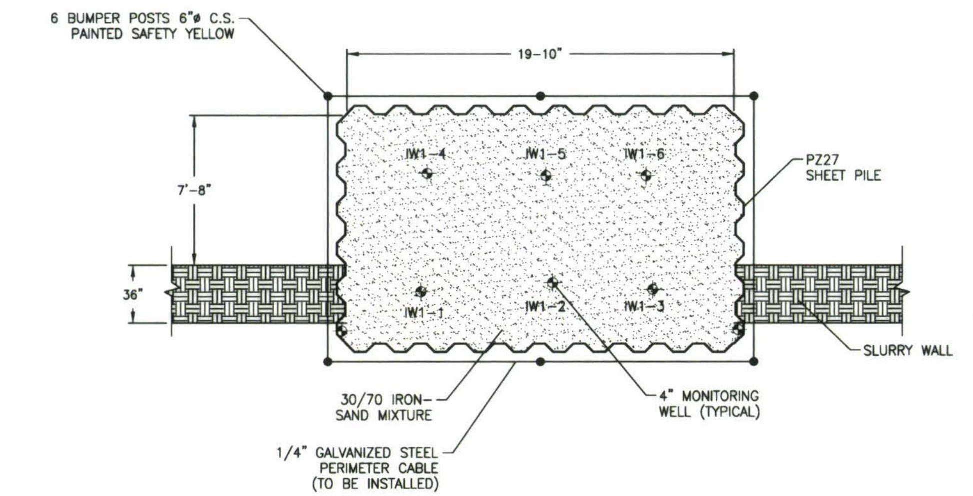
DATE: 03/05/10 | DRWN: LP/FTC

FIGURE 2-4

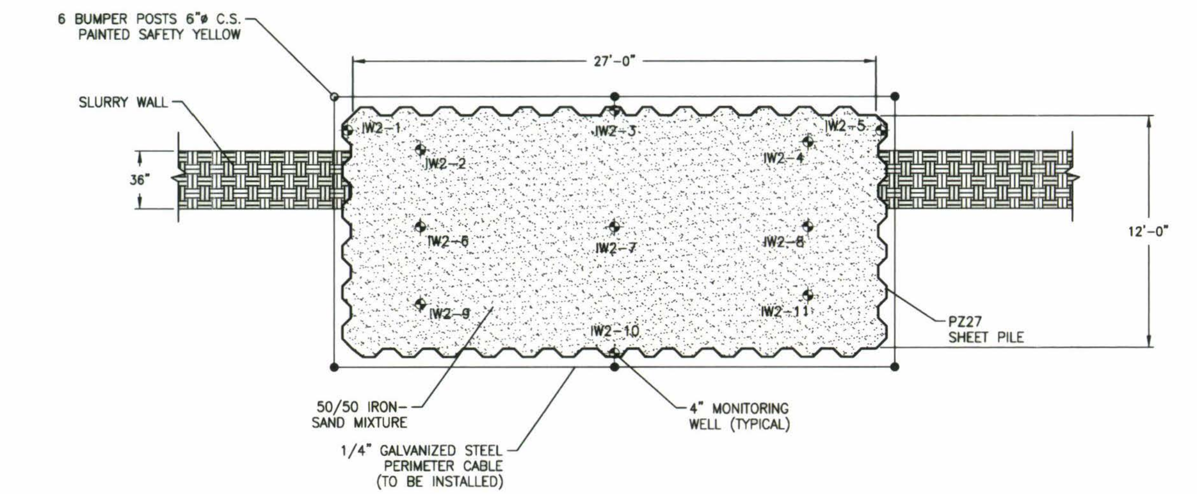


AECOM

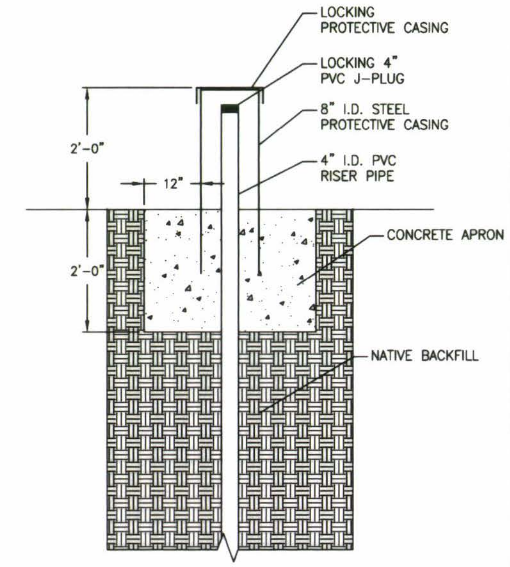
CLEAN HARBORS COFFEYVILLE, KANSAS	**PHASE I PRB GATE DETAILS**
DATE: 03/05/10 DRWN: LP/FTC	**FIGURE 2-5**



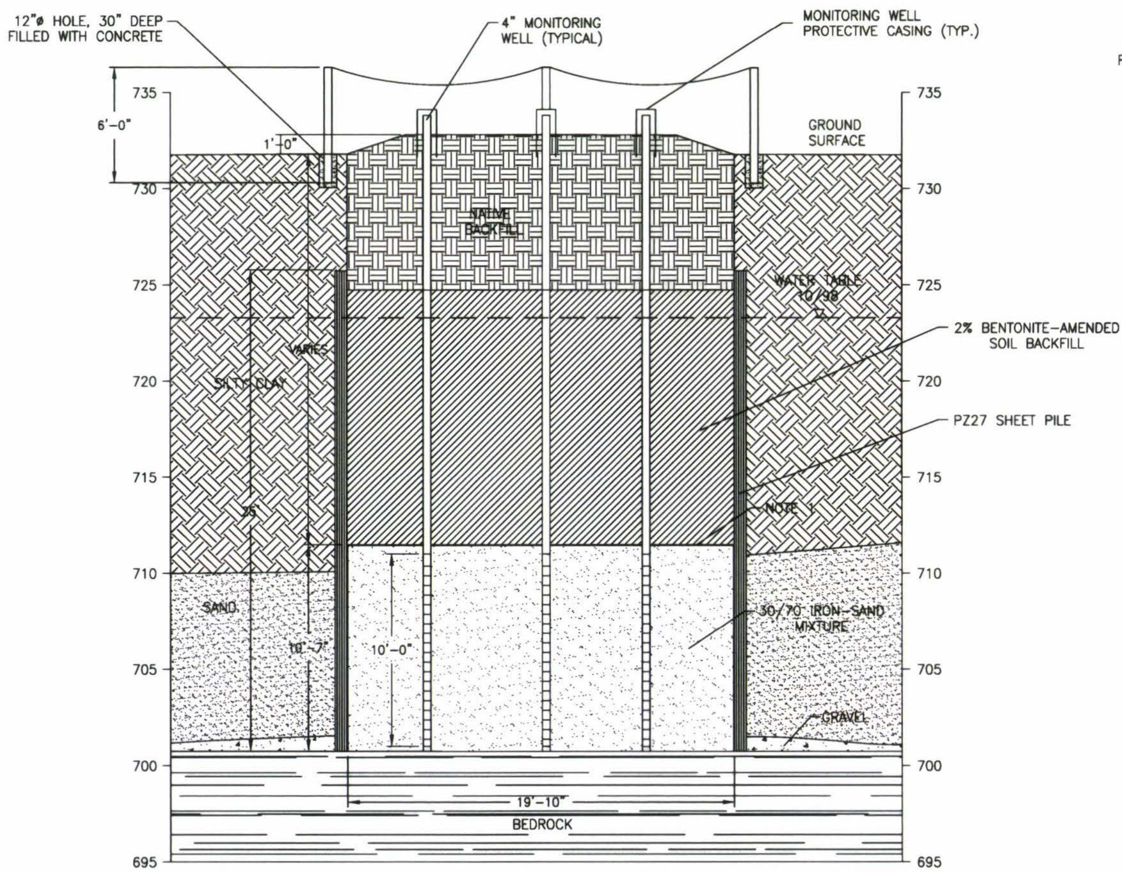
PERMEABLE IRON BARRIER #1 PLAN VIEW
Scale 1"=5'



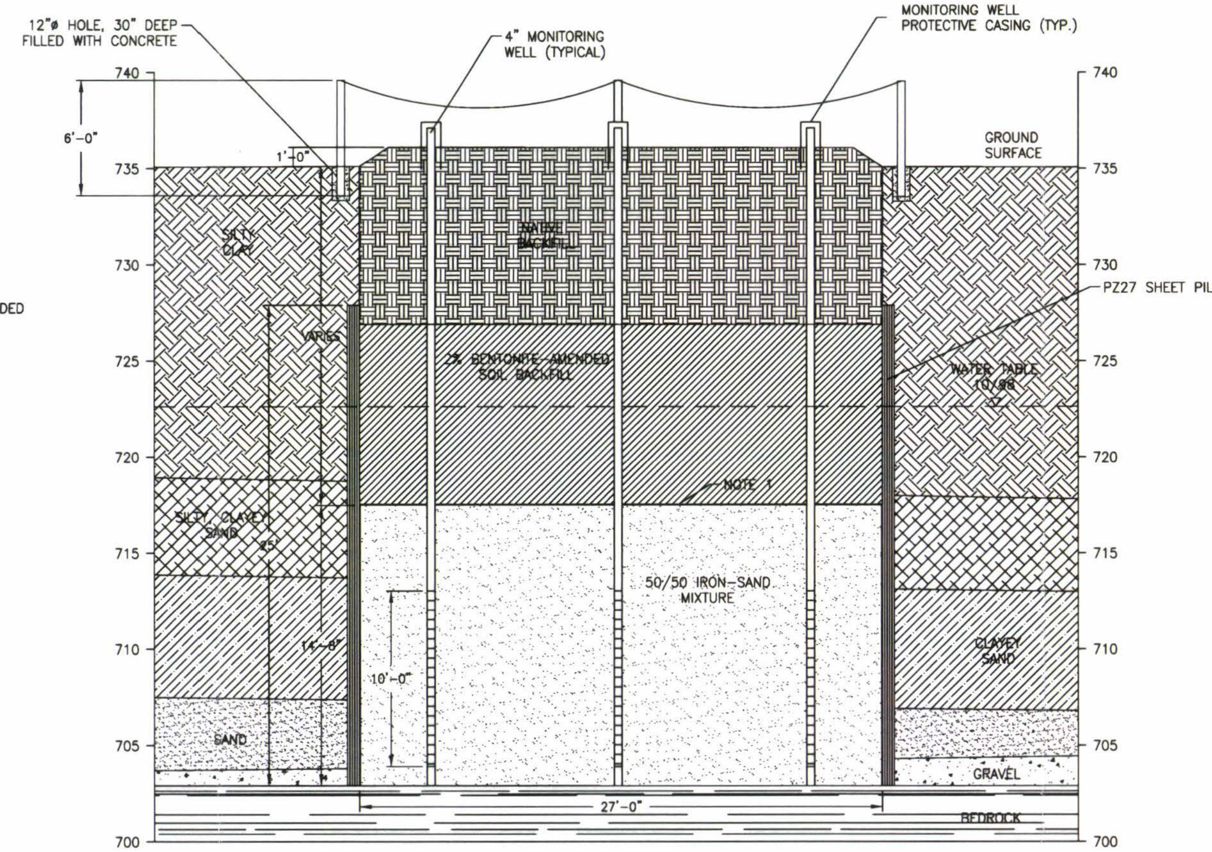
PERMEABLE IRON BARRIER #2 PLAN VIEW
Scale 1"=5'



MONITORING WELL PROTECTIVE CASING DETAIL
Scale 1"=5'



PERMEABLE IRON BARRIER #1 SECTION
Scale 1"=5'



PERMEABLE IRON BARRIER #2 SECTION
Scale 1"=5'

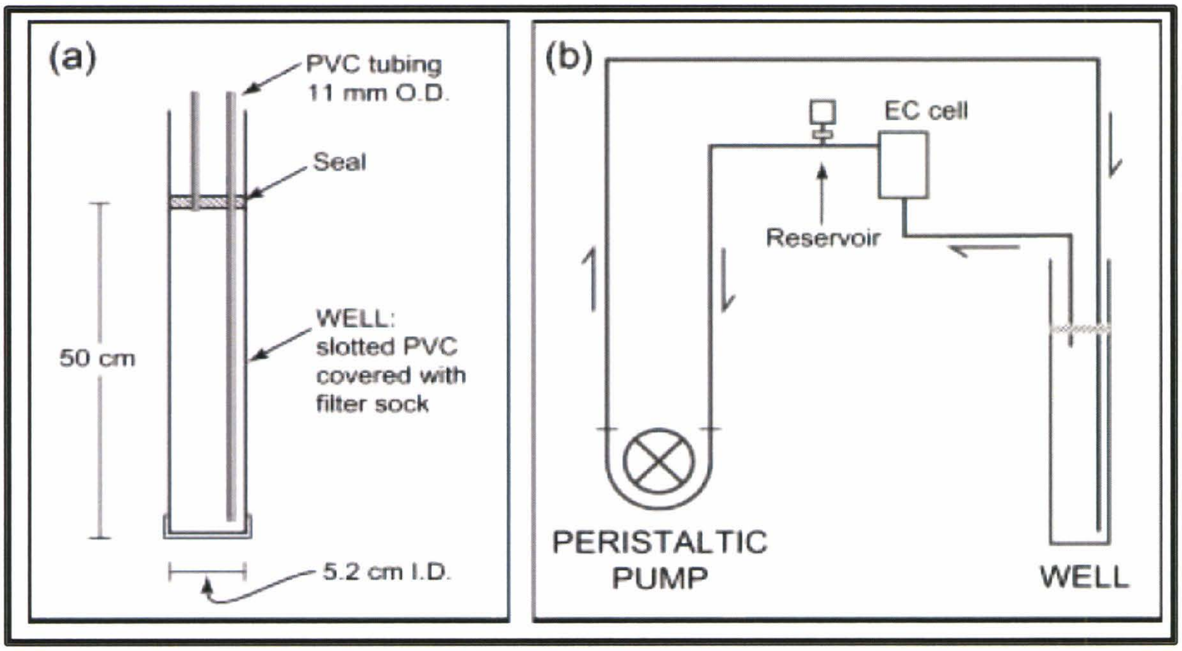
NOTE:
1) 60-MIL HDPE IMPERMEABLE BARRIER BETWEEN SOIL-BENTONITE BACKFILL AND IRON-SAND MIXTURE.

AECOM

CLEAN HARBORS COFFEYVILLE, KANSAS	PHASE II PRB GATE DETAILS
DATE: 03/05/10 DRWN: LP/FTC	FIGURE 2-6

AECOM

Five Year Review Report Clean Harbors Coffeyville LLC Facility Coffeyville, Kansas (60240275.300)		Pneumatic Slug Test Apparatus
DATE: 3/1/12	DRWN: LG	FIGURE 3-1



(a) Schematic of the Downhole Portion of the Point Dilution Appartus
(b) Schematic of the Recirulation Cell of the Point Dilution Appartus

Downhole Portion of the Point Dilution Appartus in the Field

AECOM

Five Year Review Report Clean Harbors Coffeyville LLC Facility Coffeyville, Kansas (60240275.300)	**Borehole Point Dilution Appartus**

DATE: 3/1/12	DRWN: LG		**FIGURE 3-2**

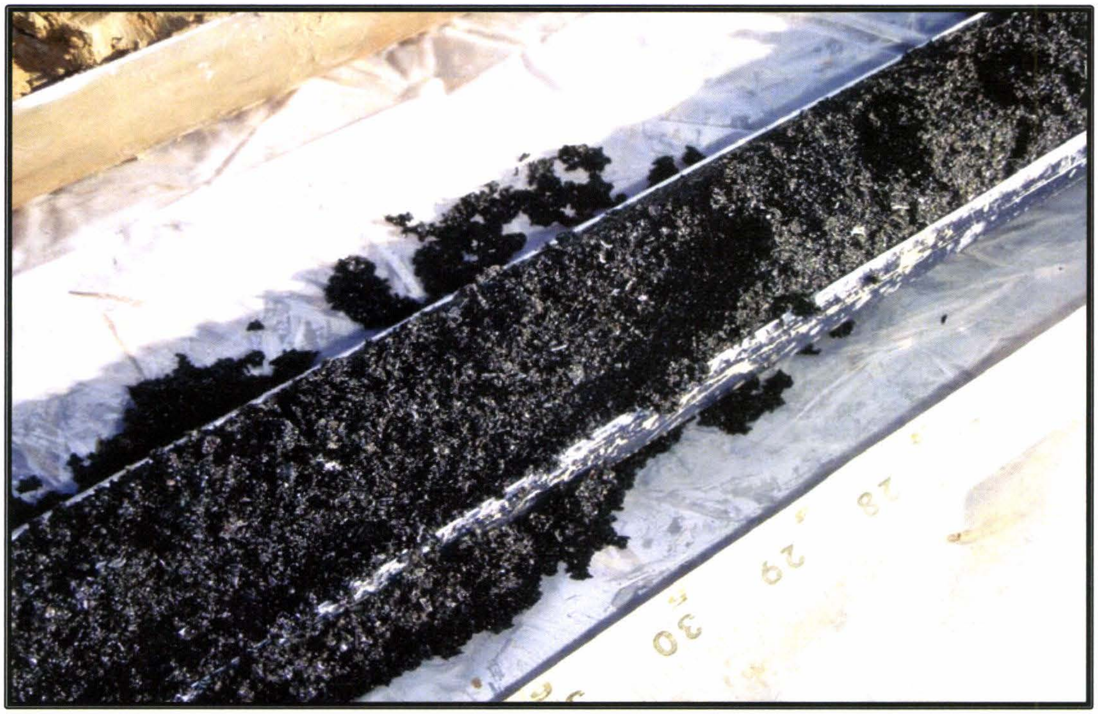
AECOM

Five Year Review Report
Clean Harbors Coffeyville LLC Facility

Coffeyville, Kansas (60240275.300)

Passive Flux Meter (PFM)

DATE: 3/1/12	DRWN: LG		FIGURE 3-3



Phase II Gate I   Iron Filings/Sand Mixture

Iron Filings From Phase I Gate Monitoring Well install M-10

AECOM	Five Year Review Report Clean Harbors Coffeyville LLC Facility Coffeyville, Kansas (60240275.300)	**PRB Media in Phase I Gate and Phase II Gate 1**
	DATE: 3/1/12	DRWN: LG	**FIGURE 3-4**

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Monitoring_Locs.mxd

AECOM

Notes:
1. See Location Detail for Gate wells
2. Imagery: Esri Online

0 150 300 600 900 Feet

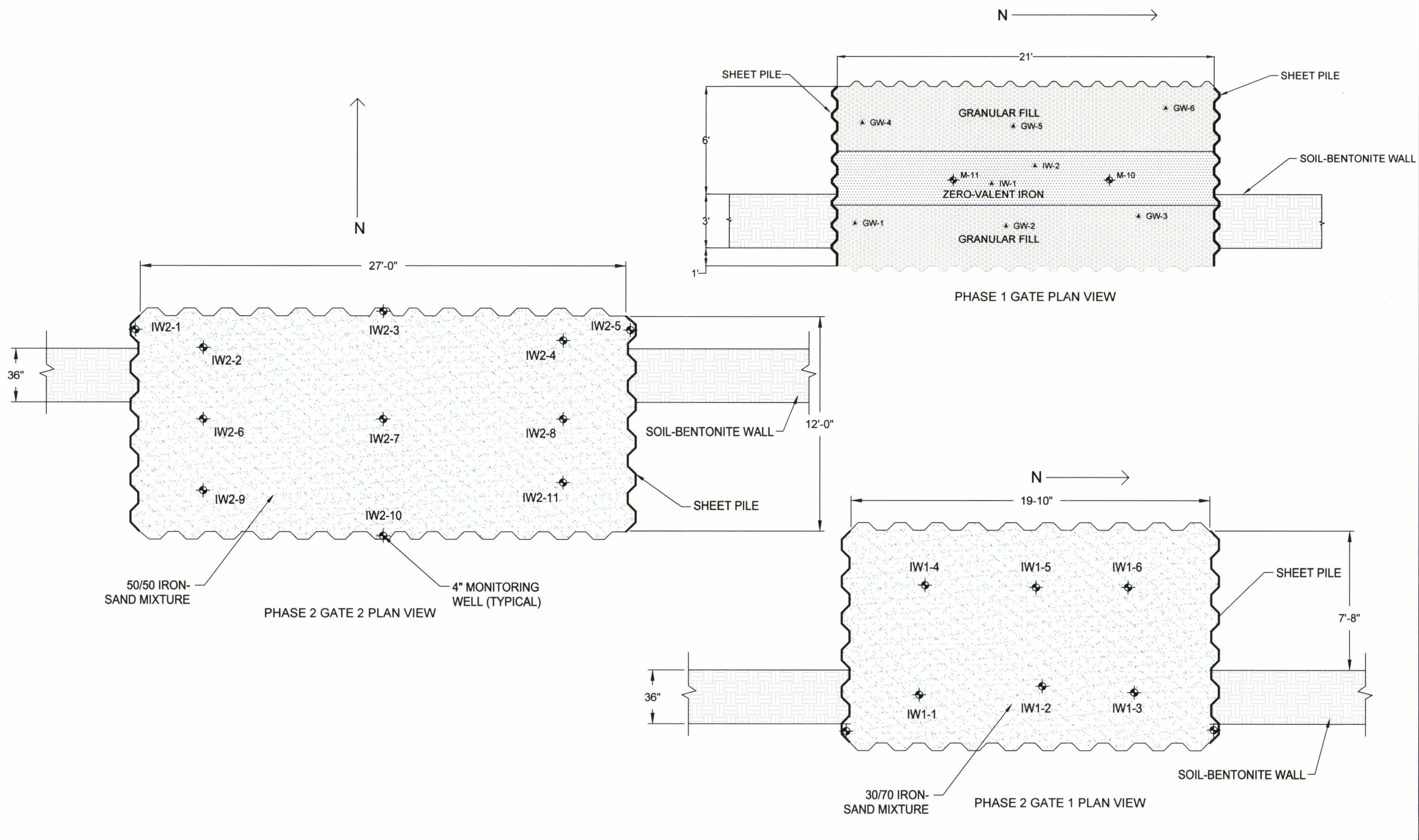
1 inch = 700 feet

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

Groundwater and Surface Water Monitoring Locations

DATE: 02/11/2013 | DRWN:RB/ftc | Revision:

FIGURE 3-5



AECOM

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-600

PRB Monitoring Well Locations

DATE: 02/26/2013 | DRWN: LP/FTC

FIGURE 3-6

File: Z:\Clean Harbors\Coffeyville\5 year plan\60240275-FIG-PRB_WellLocs.dwg Layout: Layout1 User: marshalle Plotted: Mar 15, 2013 - 8:38am Xref's:

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\PotSurfaceMap.mxd

AECOM

Notes:
1. Water elevations posted for all wells/peizometers.
2. Contour lines drawn using only data from lower alluvium wells/piezometers
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 600 feet

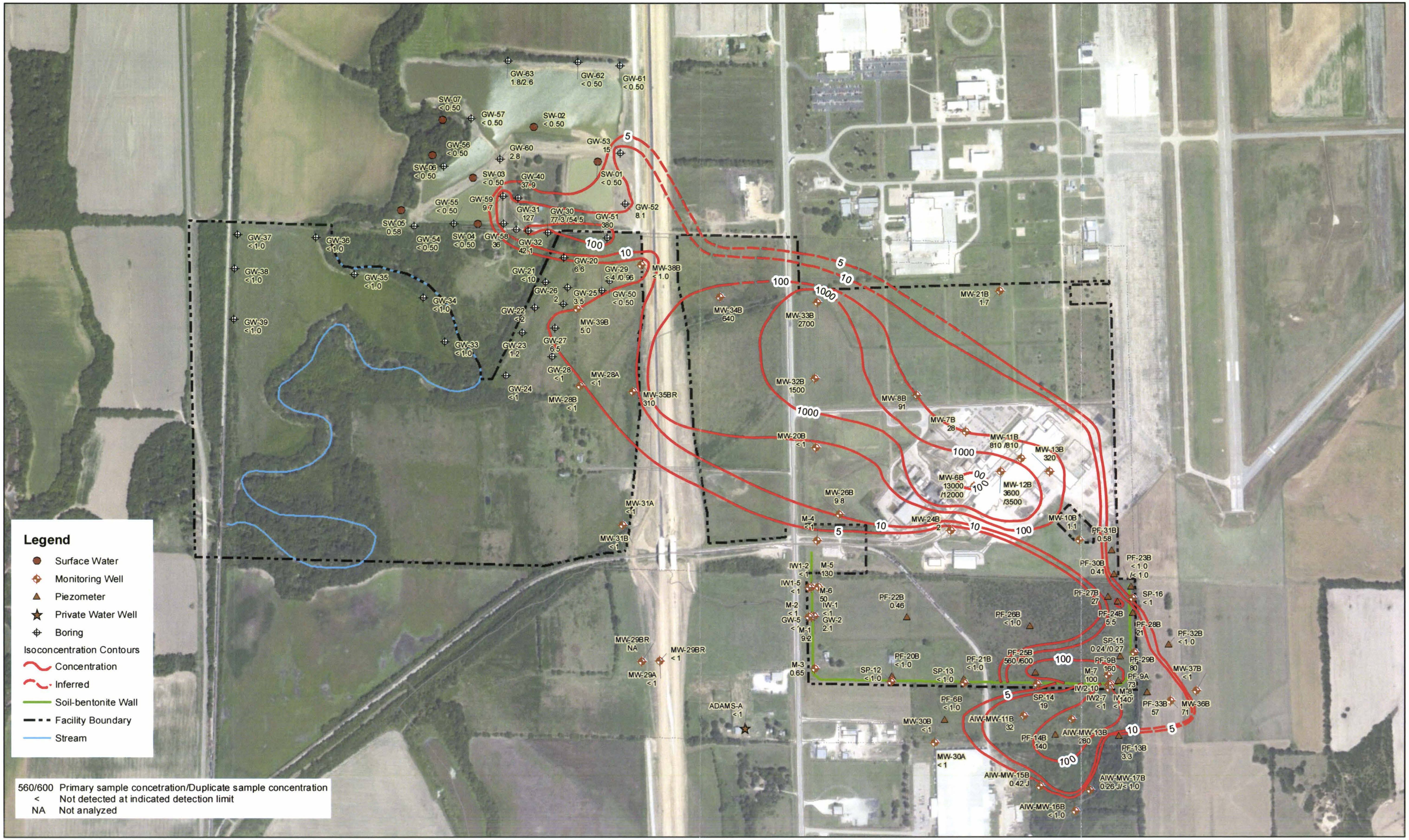
N

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

Groundwater Elevations
February 23, 2012

DATE: 02/11/2013 | DRWN:RB/ftc | Revision:

FIGURE 4-1



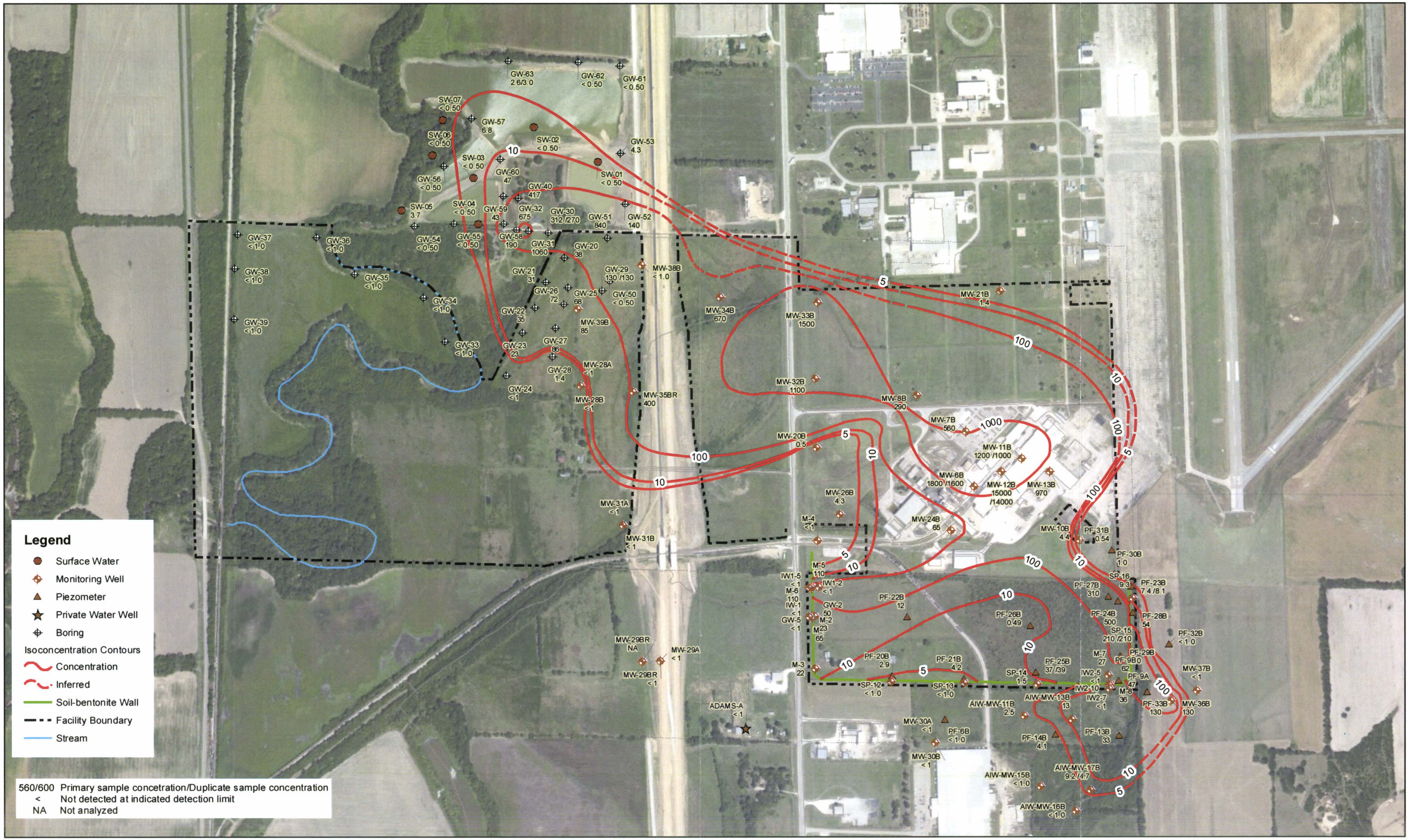
Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 700 feet

AECOM

CLEAN HARBORS FACILITY COFFEYVILLE, KANSAS 60240275-300	PCE (µg/L) Concentrations
DATE: 02/11/2013 DRWN:RB/ftc Revision:	FIGURE 4-2

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-PCE.mxd



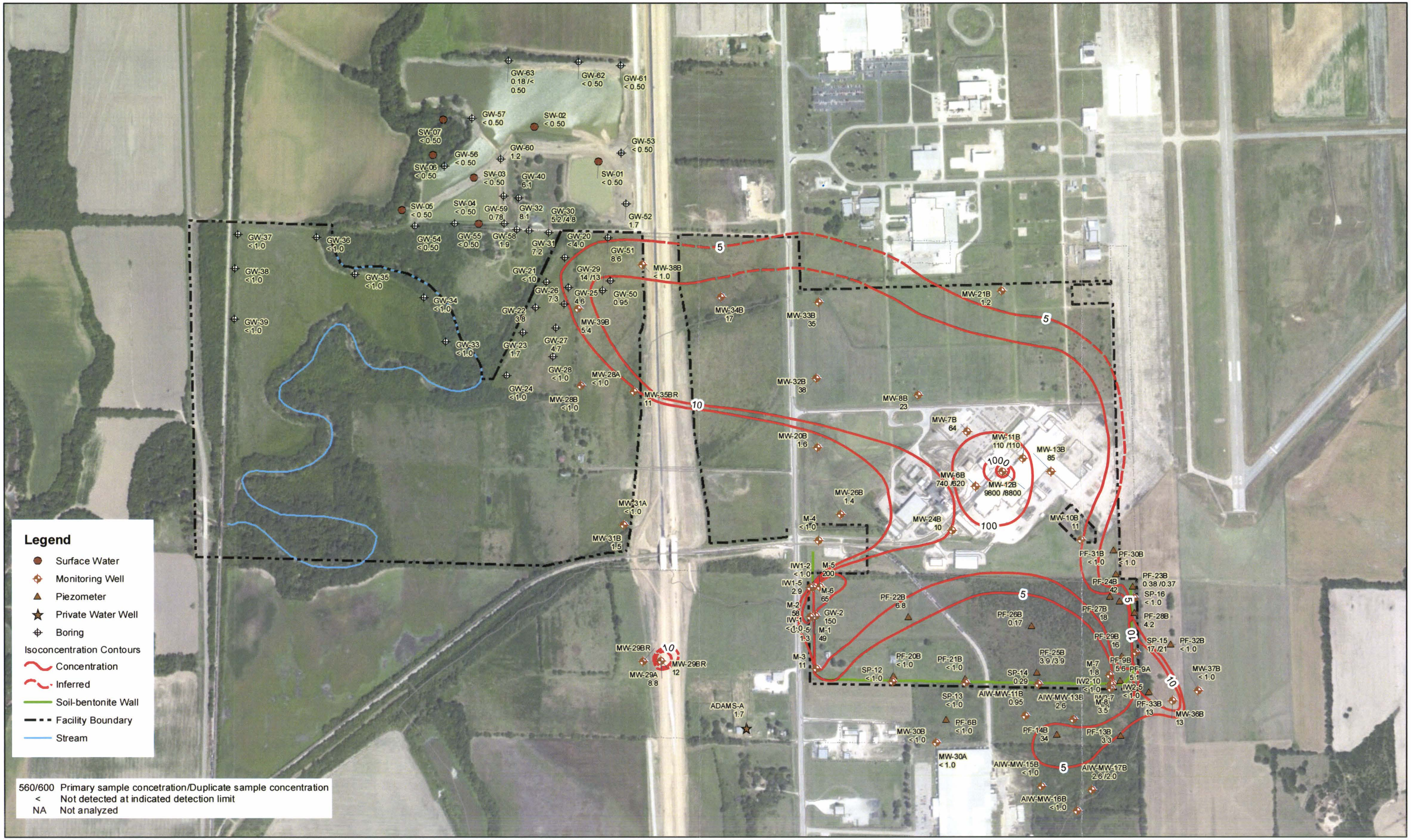
Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_ConcTCE.mxd

AECOM

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 700 feet

CLEAN HARBORS FACILITY COFFEYVILLE, KANSAS 60240275-300	TCE (µg/L) Concentrations
DATE: 02/11/2013 DRWN:RB/ftc Revision:	FIGURE 4-3



AECOM

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 700 feet

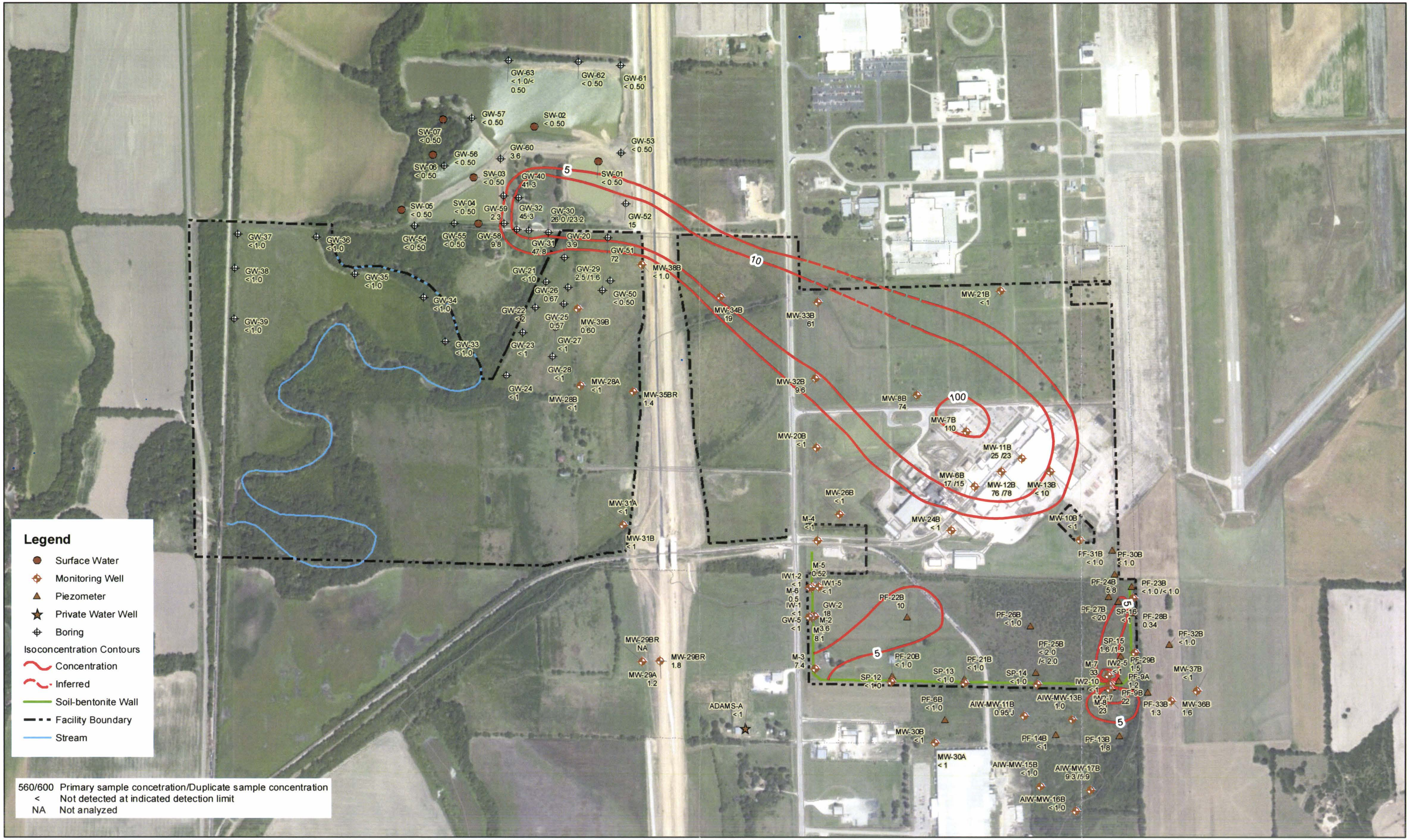
CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

cis 1,2-DCE Concentrations

DATE: 02/11/2013 | DRWN:RB/ftc | Revision:

FIGURE 4-4

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-cis12-DCE.mxd



Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 700 feet

AECOM

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

1,1-DCE Concentrations

DATE: 02/11/2013	DRWN:RB/ftc	Revision:	FIGURE 4-5

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-11-DCE.mxd

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of μg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet

1 inch = 700 feet

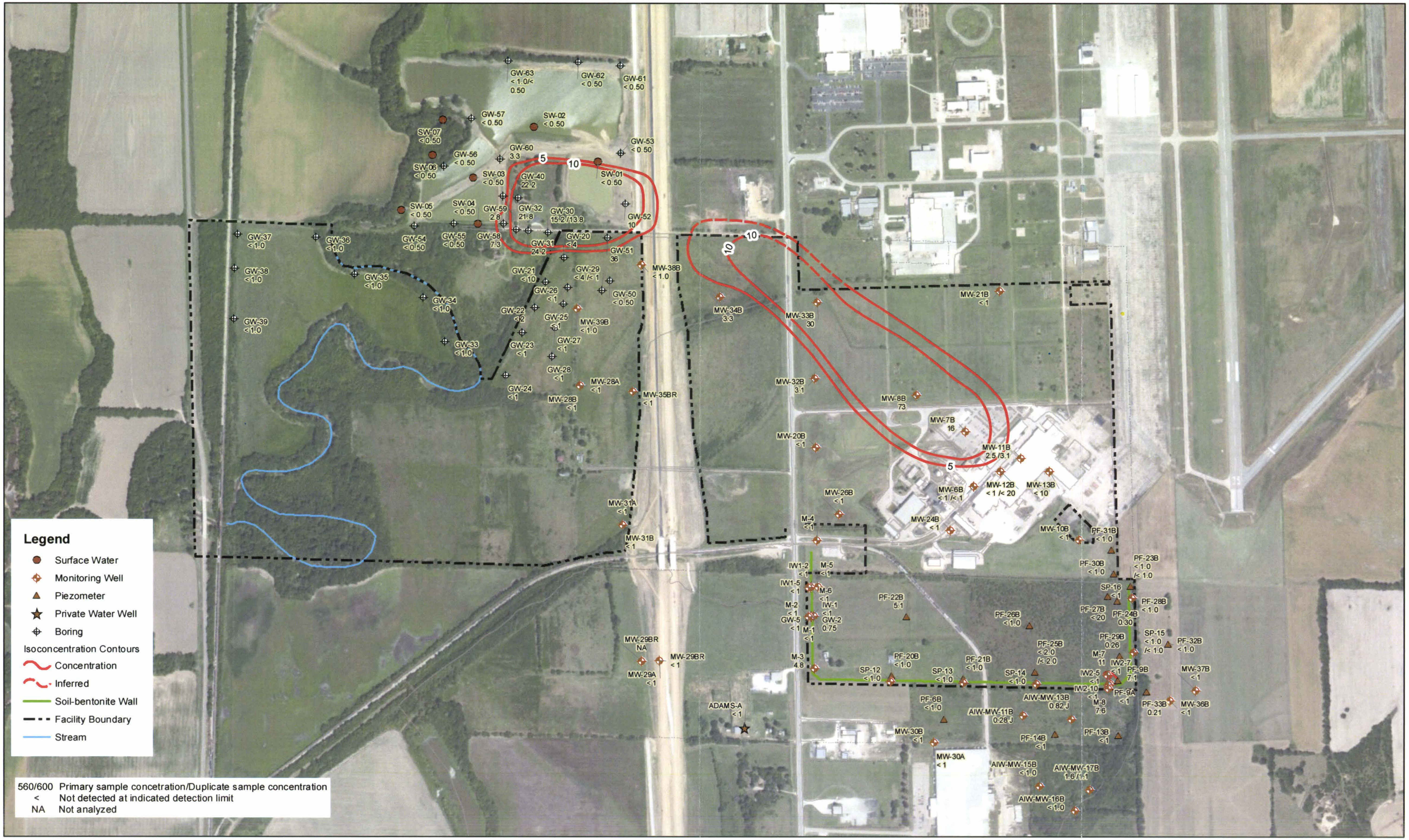
AECOM

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

Vinyl Chloride Concentrations

DATE: 02/11/2013	DRWN:RB/ftc	Revision:	FIGURE 4-6

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-VC.mxd



Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 700 feet

AECOM

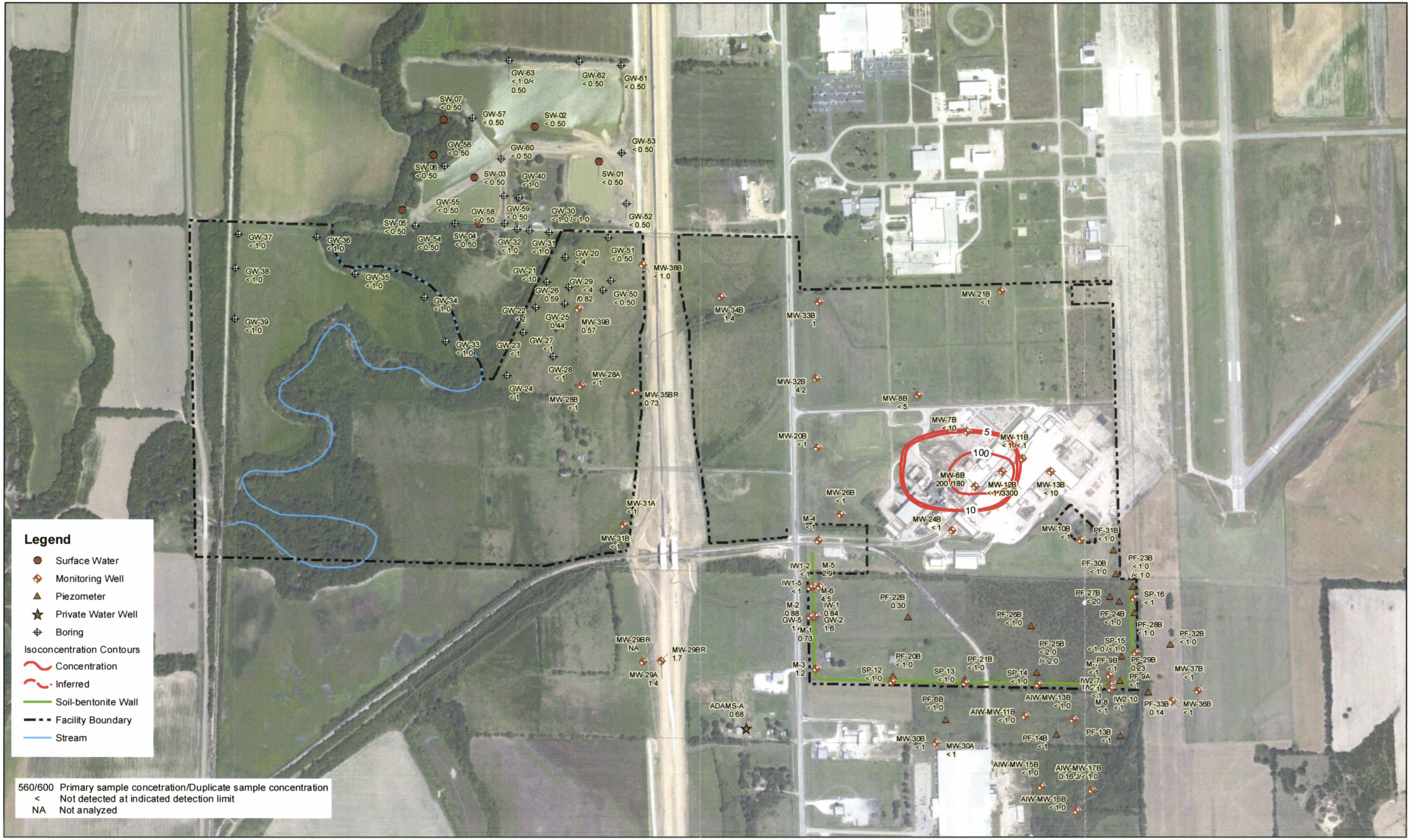
CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

DATE: 02/11/2013 | DRWN:RB/ftc | Revision:

1,1,1-TCA Concentrations

FIGURE 4-7

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-111-TCA.mxd



Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 150 300 600 900 Feet
1 inch = 700 feet

AECOM

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

1,2-DCA Concentrations

DATE: 02/11/2013 | DRWN: RB/ftc | Revision:

FIGURE 4-8

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-12-DCA.mxd

AECOM

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.

0 150 300 600 900 Feet
1 inch = 600 feet

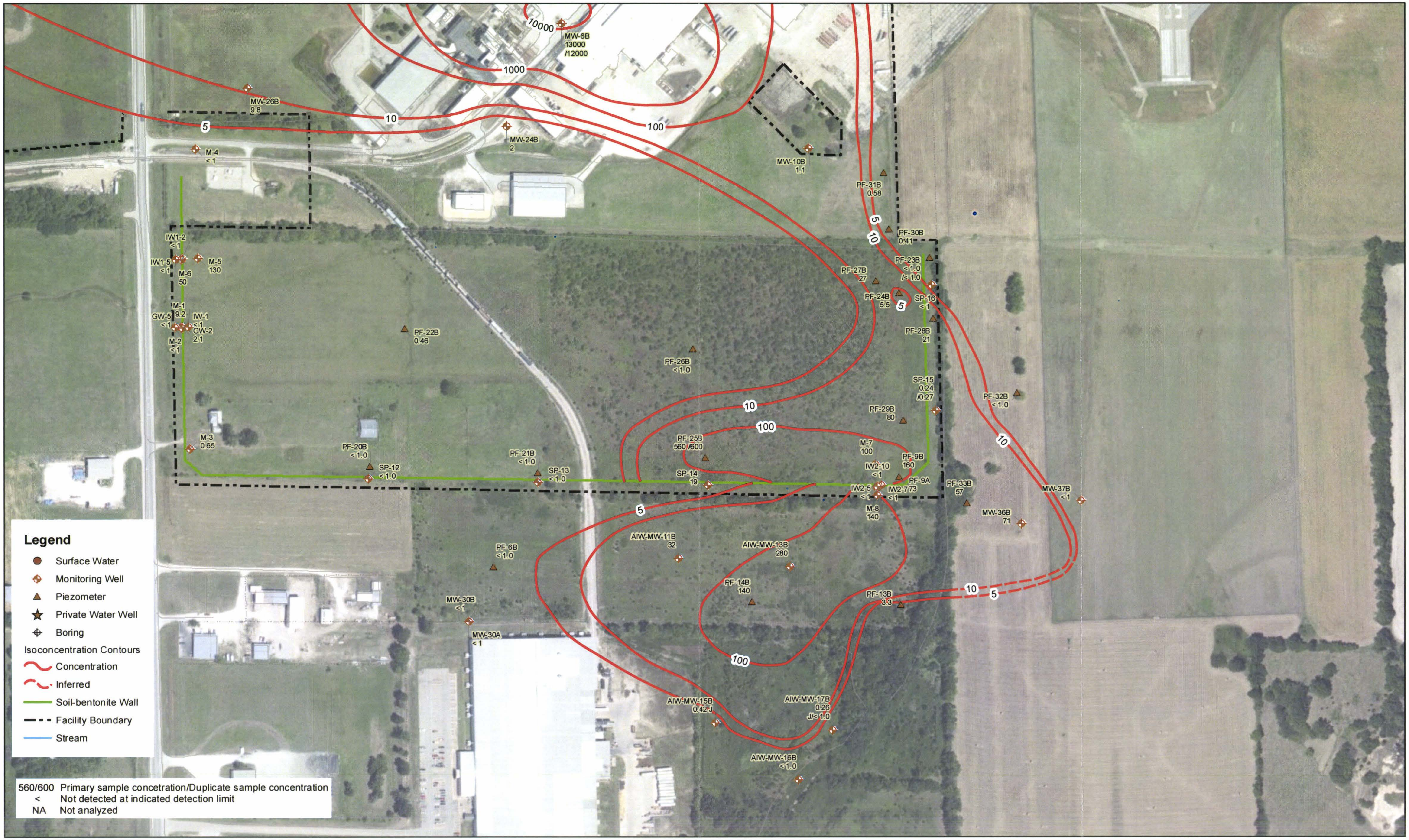
CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

1,4 Dioxane Concentrations

DATE: 01/31/2013 | DRWN:RB/ftc | Revision:

FIGURE 4-9

Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-1_4-Dioxane.mxd



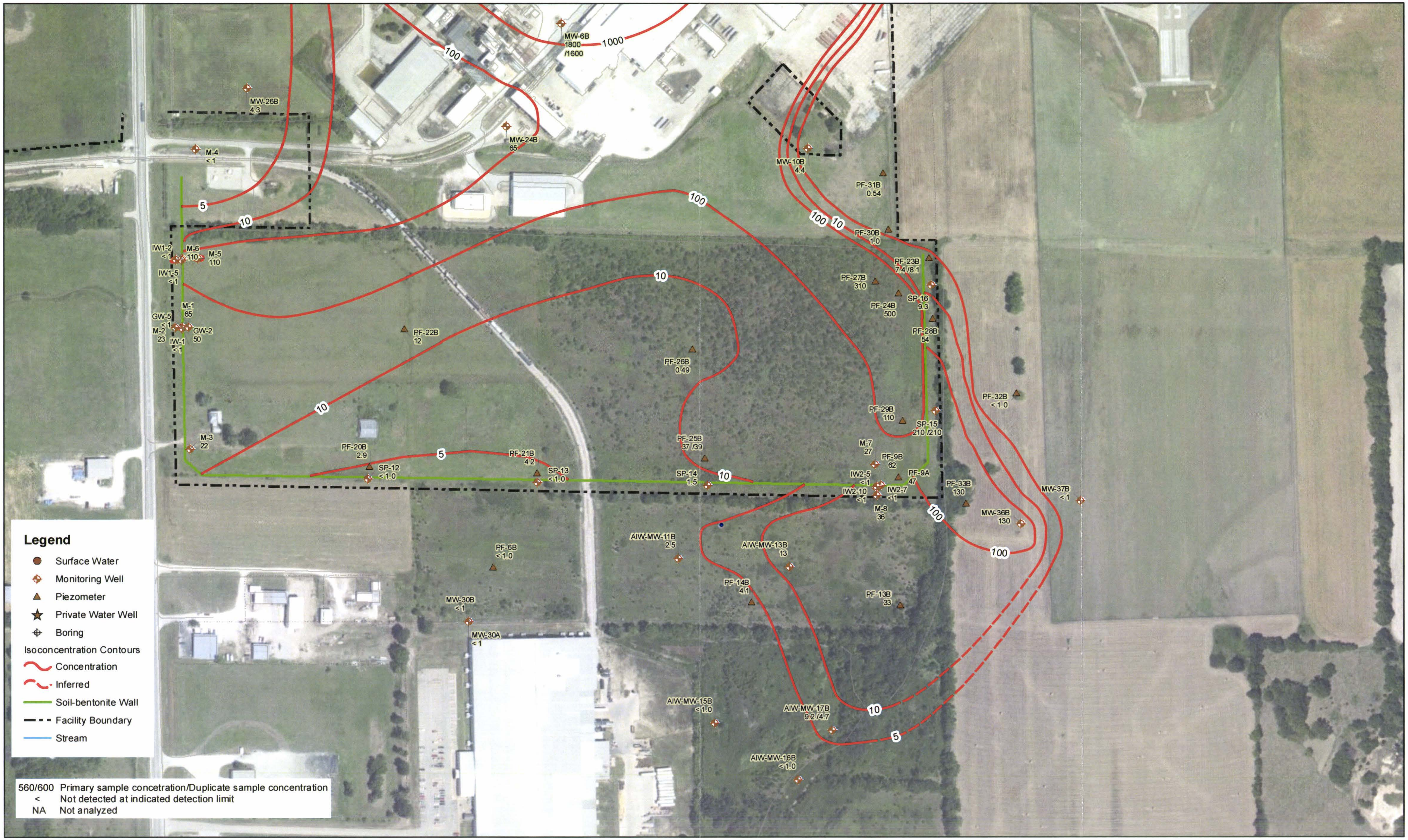
Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-PCE_SE_detail.mxd

AECOM

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 75 150 300 Feet
1 inch = 300 feet

CLEAN HARBORS FACILITY COFFEYVILLE, KANSAS 60240275-300			**PCE Concentrations - Southeast Plume**
DATE: 02/11/2013	DRWN:RB/ftc	Revision:	**FIGURE 4-10**



Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_ConcTCE_SE_detail.mxd

AECOM

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

0 75 150 300 Feet

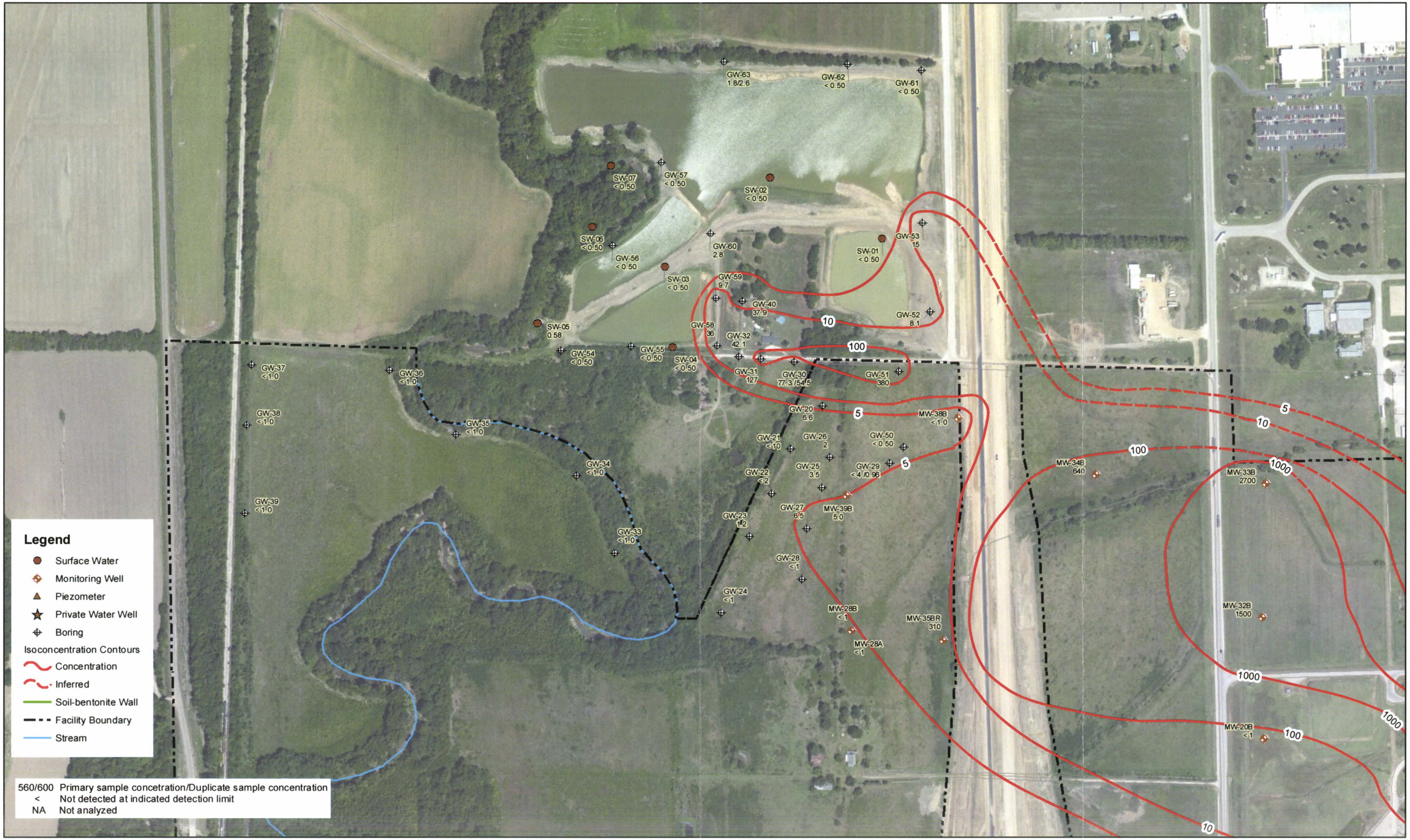
1 inch = 300 feet

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

DATE: 02/11/2013 | DRWN: RB/ftc | Revision:

TCE Concentrations - Southeast Plume

FIGURE 4-11



Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_Conc-PCE_NW_detail.mxd

AECOM

Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of µg/L.
3. Imagery: Esri Online

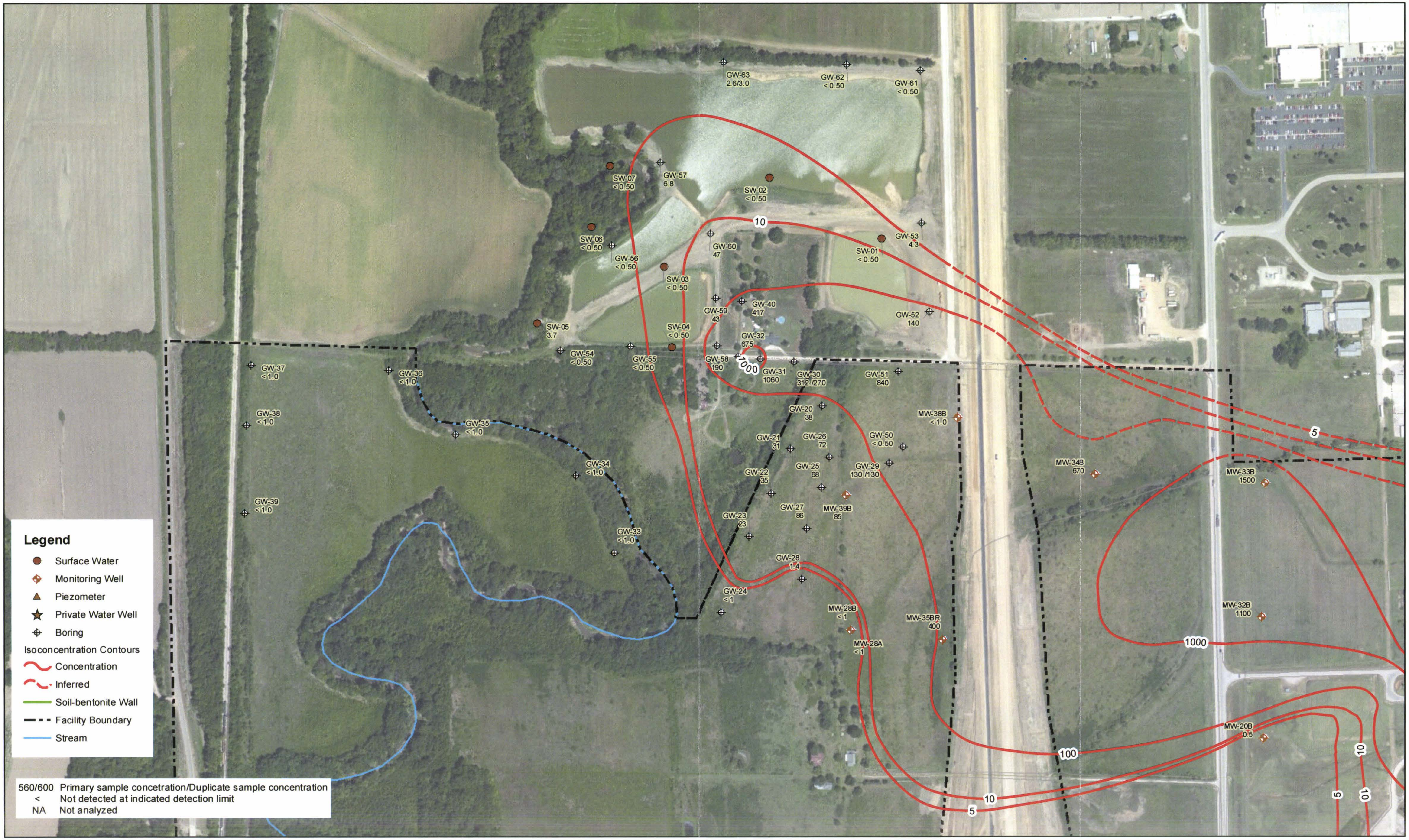
0 100 200 400 Feet
1 inch = 400 feet

CLEAN HARBORS FACILITY
COFFEYVILLE, KANSAS
60240275-300

PCE Concentrations - Northwest Plume

DATE: 02/11/2013 | DRWN:RB/ftc | Revision:

FIGURE 4-12



Path: T:\Coffeyville\Projects\Working\Five_Year_Plan\Jan_2013_Update\5-Yr_ConcTCE_NW_detail.mxd

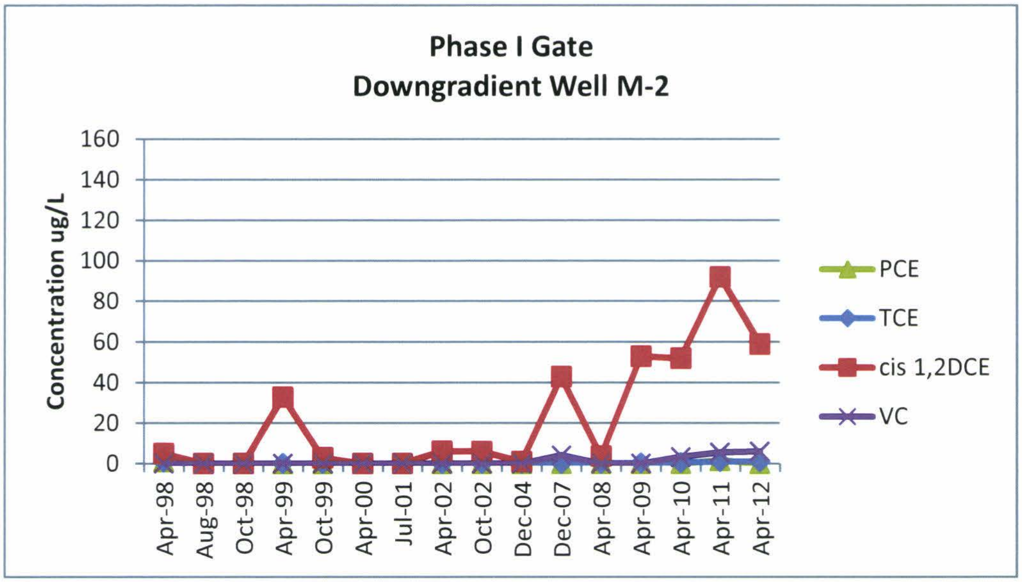
AECOM

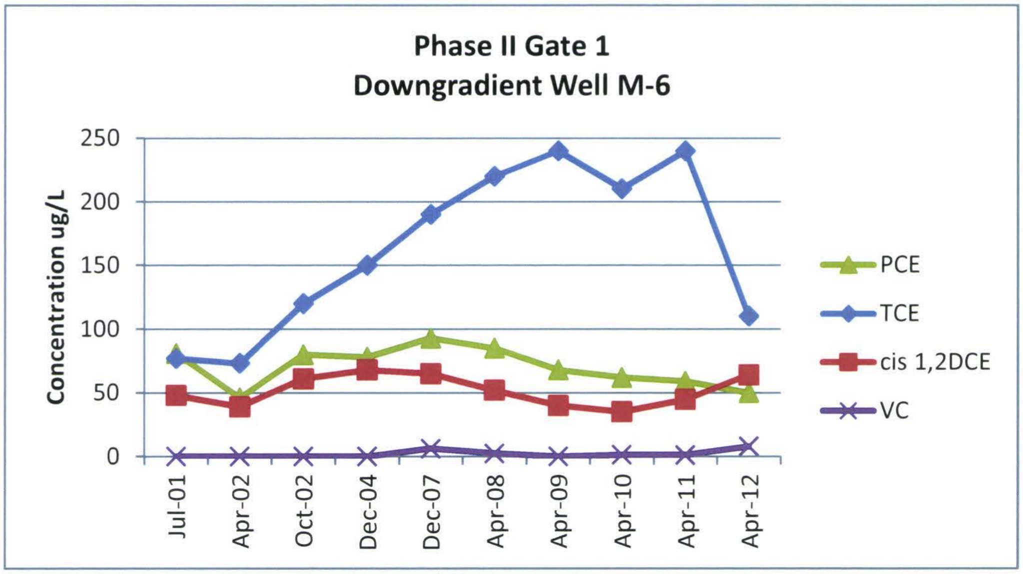
Notes:
1. Concentrations posted for all wells / peizometers sampled per 5 year review work plan.
2. All concentration in units of μg/L.
3. Imagery: Esri Online

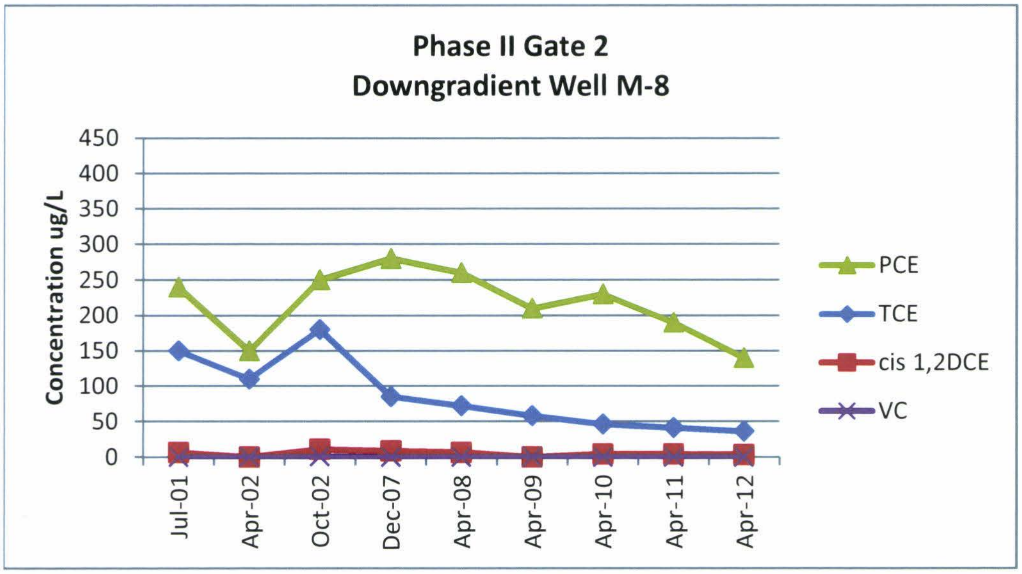
0 100 200 400 Feet
1 inch = 400 feet

CLEAN HARBORS FACILITY COFFEYVILLE, KANSAS 60240275-300			**TCE Concentrations - Northwest Plume**
DATE: 02/11/2013	DRWN:RB/ftc	Revision:	**FIGURE 4-13**

Figure 4-14 VOCs vs Time Downgradient of PRB Gates







Appendices A through D

(on CD)